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EDITORIAL

The Executive Council of the Indian National Scientific Documentation Centre resolved at its first meeting held on 7th May 1964 that the Annals of Library Science should be re-entitled the Annals of Library Science and Documentation. In accordance with the desire of the Executive Council, the Annals of Library Science is making its appearance with the expanded title.

All these ten years, the Annals had the distinction of being edited by Dr. S.R. Ranganathan, one of the foremost authorities in the field of documentation in the world. During this period, the Annals has made its mark by virtue of its original contributions and the authorities of the Insdoc are deeply grateful to the savant for his unstinted work in the editing of the Journal. We do hope that we shall have the privilege of his advice and his contributions in the future issues of the Journal. We are very happy to state that Shri S. Parthasarathy, the collaborating editor of this journal all these years will now be in sole editorship of the journal.

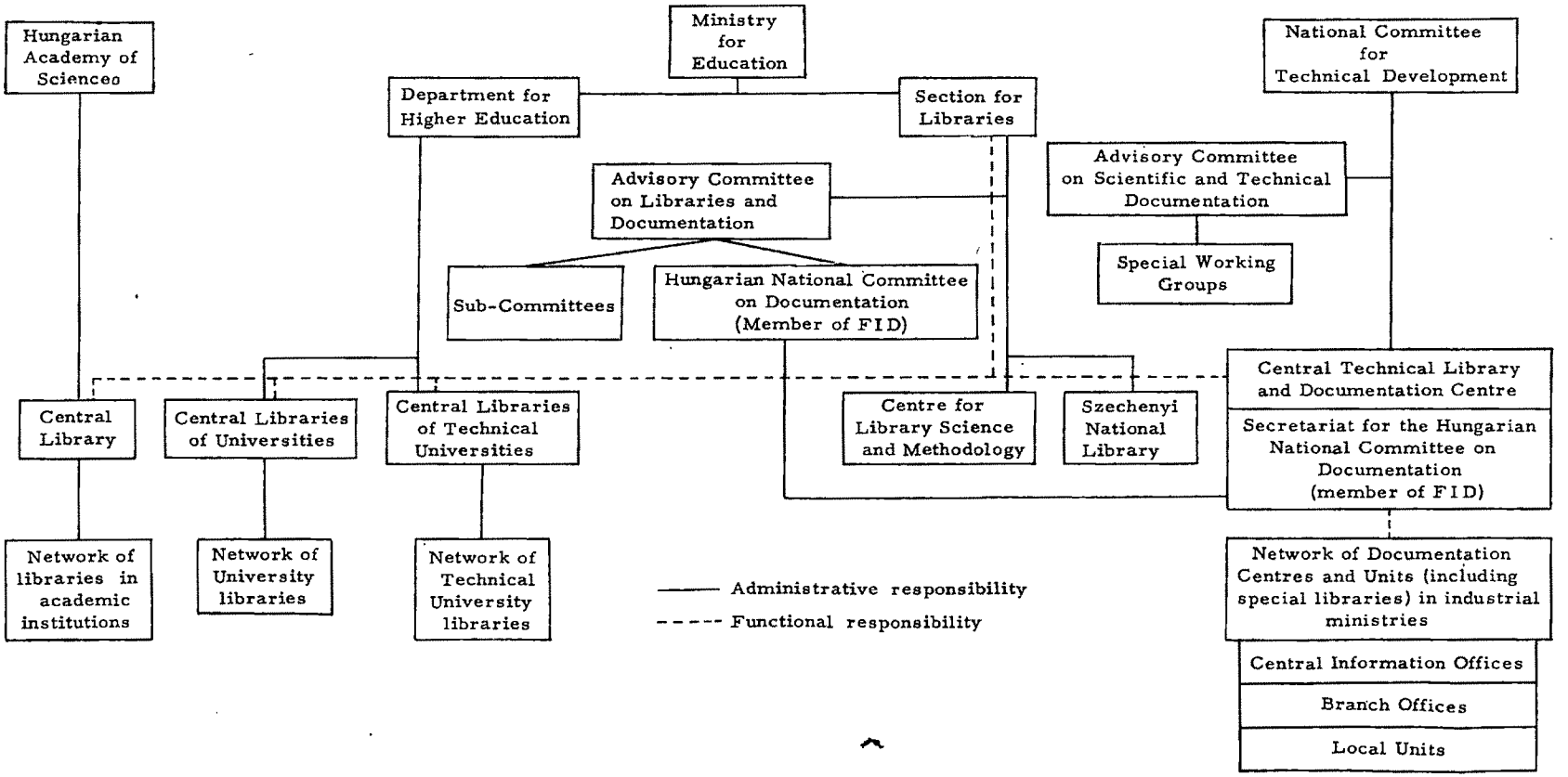
We are grateful to Dr. Peter Lazar, Director of the Documentation Centre in Hungary for his feature contribution to this issue on the organization of documentation in Hungary.

We are introducing as a regular feature a section on current documentation literature. The present issue covers more than 350 papers published in 43 documentation periodicals.

We have to apologise to our clientele for the delay in the issue of this new title. Various formalities had to be gone through before we could embark on the journal with its expanded title.

B. S. Keshavan
2nd Nov. '64

OVERALL ORGANISATIONAL SCHEME OF SCIENTIFIC AND TECHNICAL DOCUMENTATION



CALCUTTA UNIVERSITY CENTRAL LIBRARY

ORGANISATION OF DOCUMENTATION IN HUNGARY

P LAZAR*
Head, Central Technical Library
and Documentation Centre, Budapest.

Gives the setup and development of documentation in Hungary. The functions of the documentation network of the ministries consisting of 600 documentation units (DU) supervised by the Central Information Offices (CIO) and the sub-network of central libraries headed by the Central Technical Library and Documentation Centre (CTLDC) are described. The lines of development worked out by the Standing Committee on Documentation are outlined.

1 GENERAL BACKGROUND

Hungary is a small country in Central Europe with a population of about 10 million, a territory of 93,000 km and a population density of 107 per km^2. The country is not very rich in natural resources, only the large bauxite deposits, low-grade coal, oil and natural gas fields are worth mentioning. After the liberation of the country from the German Nazi invaders, Hungary chose the socialist way of development and introduced economic planning methods. Because of the scarcity of natural resources, the country had to develop strongly foreign trade, and in order to raise the standard of living of millions of people kept in poverty during centuries by their landlords and other oppressors, it had to develop industry.

The national income amounted in 1962 to 150.10^9 forints (30.10^9 rupees), that is about 15,000 forints (3,000 rupees) per head. Out of the national income 72% was spent for consumption, 18% for investment and 10% for increase of stocks. Industry's share in the national income rose constantly and reached 62% in 1962 whereas the share of agriculture declined to 19%.

The significance of foreign trade in the country's economy was featured by the fact that the value of imports represented 30% of the national income, whereas 42% of the value of the industrial production (without food processing), 17% of food processing and 9% of the agricultural production was exported. Machines and equipment accounted for 26% of imports and 37% of exports.

The wholly nationalised industry employed 1.4 million persons in 1962, and the 125 research institutes and the 665 university departments and academic institutions employed a total staff of 25,000 in 1961, out of the latter 11,000 were scientific research workers and members of the teaching staff. Of these 28% were engaged in technical, 20% in natural, 14% in agricultural, 22% in medical and 16% in social sciences.

The number of engineers amounted in 1960 to nearly 30,000 out of which 44% were engaged in industry, 7% in building industry, 12% in transport, commerce and other services, 10% in public administration, 21% in education, research and development (R & D).

In consequence of the prevailing situation, the country is striving for the best utilisation of its resources especially human resources, technical skill, scientific research, and education. Documentation plays a very important role in developing human resources directly which in its own turn has a strong impact on scientific, technical and economic development. The government took notice of the outstanding value of documentation and recently took steps to initiate further development of documentation services necessary for the achievement of the targets of the development plans of the country.

2 THE PAST DEVELOPMENT OF DOCUMENTATION

Before the liberation of Hungary after the Second World War in 1945 documentation

* *At present at Insdoc as an Unesco expert.*

was not felt necessary neither for industry which depended mostly on foreign capital, nor for scientific research being confined to a small number of scientists and institutions. Only the developing needs of the country after 1945 and the limited resources in equipment, material, energy and later on in manpower to meet these needs made clear the role of documentation in the economic development of the country devastated to a very large extent by the German Nazi hordes. The Union of Engineers and Technicians started early in 1947 with the publication of the first Hungarian abstracts journal. The nationalisation of the industry in 1948-49, the introduction of the economic planning system and the establishment of a National Council for Science (NCS) (Tudományos Tanács) gave rise to the organisation of the National Documentation Centre (NDC) (Országos Dokumentációs Központ) under the supervision of the NCS in 1949. The NDC organised four Sectorial Documentation Centres (DC) in Science and Technology, Agriculture, Medicine and Economics, published books on various documentation problems, prepared a medium Hungarian edition of the UDC, set up a union catalogue of scientific and technical periodicals, started standardisation in library and documentation work within the Hungarian Office for Standardisation, laid down the basic principles of methodology in several branches of documentation, arranged training courses in documentation and classification and organised the compulsory registration and the central deposit of translations and the documentation of documentation literature. This provisional start has been somewhat hampered after the creation of the new Hungarian Academy of Sciences (Magyar Tudományos Akadémia, MTA) in 1950, which took over the tasks and responsibilities of the NCS but did not want to continue the supervision of the NDC. The NDC has been transferred to the Ministry of Culture and then soon liquidated. But the Sectorial DC's survived the crisis and grew into independent developing institutions, except the DC for Economics which ceased to function in 1954.

The Scientific and Technical DC (Műszaki Dokumentációs Központ) has been united in 1950 with the old Library for Technology (Technologiai Könyvtár) and taken over in 1952 by the Ministry for Culture. The institution was later named Central Technical Library and Documentation Centre (CTLDC) (Országos Műszaki Könyvtár és Dokumentációs Központ, OMKDK).

Later on many local special libraries came into being in various research institutes, industrial works and other institutions, providing usual library services but on many occasions documentation services as well. As the needs of research and industry grew further, central offices in some ministries have been established, which at first managed chiefly translation work, but gradually took over other responsibilities in documentation as well.

The Library Bill of 1956 put an end to this first period of development by constituting among other networks the network of scientific and technical libraries, the centre of which became the CTLDC, then under the supervision of the Ministry of Culture.

This Ministry could not take the responsibility for the CTLDC's right or wrong attitude concerning scientific and technical problems, though for a long time no suitable government organ existed with the capability of instructing the CTLDC and its network of special libraries in matters of scientific and technical development.

In 1960 a small group was established in the Planning Office to study the problems of technical development and to make suggestions to the Planning Office as to the most important and most promising directions for development. Out of this small nucleus emerged in 1962 the National Committee for Technical Development (NCTD) (Országos Műszaki Fejlesztesi Bizottsag, OMFB), a collegial body of 45 members including leading scientists and engineers, representatives of the ministries, of the Council for Science and Higher Education (Tudomanyos és Felsőoktatasi Tanacs, TFT) and of the Hungarian Academy of Sciences. The NCTD is an advisory organ to the government, but has also executive functions in direct supervising the CTLDC and directive functions in directing scientific and technical information on a national basis.

3 THE PRESENT SITUATION

As a result of un-coordinated and often spontaneous developments in several spheres and levels of government, science and industry, the present situation is lacking co-ordination and integration covering both organisation and methods, moreover a careful planning of development of scientific and technical documentation for the near future and for the perspective.

3.1 Documentation Network of the Ministries

At the local level, about 600 documentation units (DU) are working in about 100 research institutions and several hundred industrial works, some of them extending their scope to several thousands of users. Their total stock exceeds 3 million volumes. The total number of personnel consists of about 600 full-time workers (librarians, documentalists, translators, etc.) and about 800 part-time workers.

These local units are parts of the parent organisations whose directors are responsible for their management and accredit their budget, staff and localities. In general, these DU's are understaffed and lacking in suitable working and reading accommodation. Financial support is much more readily available to them though in some institutions, there arise difficulties due to the Chief Accountant's lack of understanding for the mission of these organs.

All DU's research institutes, works and other institutions of the industrial ministries are supervised by the ministries' central information offices (CIO) including the ministries Central Libraries which are centres of a ministerial sub-network within the network of scientific and technical libraries. This network is headed by the CTLDC since 1956.

Though many of the scientific and technical libraries fulfilled some documentation tasks and rendered documentation services as well, the scope of the network of scientific and technical libraries has to be widened into a network of scientific and technical DU's.

The industrial ministries engaged in scientific and technical documentation sub-networks are:

Engineering and Iron Metallurgy;
Heavy Industries (Mining, Power Development, Chemical Industry);

Light Industries (Textiles, Leather & Leatherware, Clothing, Paper, Wood, Furniture).

Food Industry;
Building Industry (Planning, Construction, Building Materials);
Transport and Communication.

The shape of the CIO's is formed according to the special tasks of each ministry. So the ministries for Engineering and Iron Metal lurgy, Heavy Industries, Building Industries and Transport and Communication have set up large CIO's as independent governmental or research organisations with a staff exceeding 100-200. The Ministry for Light Industries preferred to transmit supervisory obligations to its Department for Technical Development, whereas the Ministry for Food Industry entrusted its Central Research Organisation with carrying out the tasks related to the guidance and supervision of its own sub-network of documentation units.

Some of the ministries (Engineering and Iron Metallurgy, Light Industries) have started already organising branch offices but rather on a pilot basis.

The direct contacts in documentation between the CIO's and the local units are not always satisfactory owing partly to the fact that the CIO-s' working programmes do not confine themselves to documentation but extend rather heavily to other fields of information as well (exhibitions, films, conferences, workers' training courses, etc).

Though the CTLDC has developed very good and close direct contacts with the local units as a result of a well-planned and executed field-work during the last 5-6 years, this institution cannot take over fully the direct responsibility for the methodical guidance of the local units being explicitly the task of the competent ministries.

The CIO's issue many publications directed in a differentiated manner to various categories of users. Among these publications information materials (bibliographic lists, abstracts, reviews of literature, trade catalogues, etc.) and original contributions (research reports, papers, short notes, etc.) are both represented.

3.2 The Central Technical Library and Documentation Centre

The CTLDC has developed into a complex information organ since 1962 under the supervision of the NCTD.

The Central Technical Library (CTL) with a stock of about nearly 300,000 volumes and 3,000 current periodicals and with its

yearly acquisition of about 12,000 volumes is the fundamental library of Hungary in the various branches of technology. As a separate department, it includes one of the largest patent collections of Europe with about 5 millions of patent specifications and with an yearly addition of about 300,000.

Besides serving some thousand individual and official borrowers the CTL also forms partially the basis of the documentation carried out by the Technical Documentation Centre (TDC), the field of activity of which extends from abstracting, searching and reviewing to translating scientific and technical literature. Nearly 85,000 abstracts are made and published yearly in 13 series called reviews of foreign scientific and technical literature in the fields of physics, chemistry, mining, metallurgy, energy, engineering, electrotechnics, textiles, food industry etc. The abstracts are also available on cards as a card service organised and classified according to UDC.

A special service is provided for literature searches extending rapidly owing to the strong impact, the display of literature searches and the possibility of ordering such searches offered by the CTLDC at the Budapest Industrial Fair 1963 had on research workers and engineers. As a result of this offer about 6,000 literature searches have been requested by experts and worked out by the CTLDC. The very modest normal yearly demand of about 300 literature searches will be doubled during 1964.

The TDC publishes a series of publications devoted to the economic aspects of research, development and production (R&D&P). These series consist partly of reviews of literature on actual subject themes and partly of digests of outstanding articles, reports, etc. Very thorough and detailed review monographs are published on various scientific, technical and economic questions.

Abstracting and reviewing is done by external experts, guided by staff people who participate in literature searches as well.

As Hungary is a small country with a very specific language much stress has to be laid on translation, especially translations from foreign languages into Hungarian. The National Register of Translations established in 1949 by the then NDC is incorporated into the CTLDC. Before starting a translation every institution has to send in a written application to the Register asking for permission to translate the document, without regard to the subject theme of the text. Translations of official documents and translations made by publishing houses are exempted. The National Register has to notify the applicant within 48 hours if the translation is already registered or not. In the affirmative case, the Register informs the applicant about the translating body and prohibits the translation being made once again unnecessarily. After completion one copy of every registered translation has to be sent to the National Register which checks the translation against the Register and afterwards passes them on to the competent Documentation Centre to be stocked and used.

The number of applications for translation rose by 100% during the five years from 1959 to 1964 from 25,000 to nearly 50,000 the majority of which is related to science and technology. The average length of a translation is about 15 pages.

The translation section of the CTLDC is managing about 40% of all translations made in the country with the aid of external translators specified according to language and subject theme.

The Methodical Section of the CTLDC carries out the tasks of the Centre of the scientific and technical libraries' network. Associated with this purpose the Section organises besides regular on-the-spot surveys, national and branch conferences, training courses, publishes the CTLDC's Journal Tudományos és Műszaki Tájékoztatás (Scientific and Technical Information) and several series devoted to the theory and practice, methodics and organisation of documentation.

Recently the Section established a National Film Information Centre with a view to introducing and widening the use of scientific and technical films as a media for scientific and technical information.

The CTLDC has earned a country-wide reputation with its direct library and documentation services to the users and with its achievements in the organisation and guiding the network of scientific and technical libraries. The new tasks set out by its new lead-

ing body, the NCTD require new approaches of thinking, new methods and a reconstruction of the organisation of the Institute, especially with regard to the greater responsibilities in overall methodical and organisational guiding of the network of documentation units.

3.3 Other Institutions

Besides the NCTD the Ministry for Education has also a certain authority in scientific and technical information, being according to the Library Law of 1956 the central organ responsible for the libraries' work, special libraries included. The ME's Library Section, till 1962 the supervisory body to the CTLDC, asserts its functional responsibility through the CTLDC.

The NCTD and the ME have both an advisory body on library and documentation matters. The NCTD's Standing Committee on Documentation is concerned with preparing reports and suggestions to the NCTD on the most important and actual problems of scientific and technical documentation. The ME's National Committee on Librarianship and Documentation (Orszagos Könyvtárugyi es Dokumentációs Tanács, OKDT) consists of sub-committees on various aspects of library and documentation work, one of these sub-committees being the Hungarian National Committee on Documentation (Országos Dokumentációs Bizottság, ODB), the Hungarian member of FID. The CTLDC provides for the Secretariat of the National Committee on Documentation.

There are still other governmental and non-governmental bodies concerned in one or more ways with scientific and technical documentation. They all have their representatives either in the NCTD or in the NCTD's Committee for Documentation or in the ME's Committee for Documentation. Such bodies are:

the Ministry of Agriculture with its Central Library and Documentation Centre (Országos Mezőgazdasági Könyvtár es Dokumentációs Központ, OMgKDK);

the Hungarian Academy of Sciences in its Central Library and its network of libraries attached to academic institutions;

the Hungarian Office for Standardisation (Magyar Szabványügyi Hivatal, MSzH) with its unique international standards collection;

the Hungarian Patent Office (Országos Találmányi Hivatal, OTH);

the Hungarian Central Statistical Office (Központi Statisztikai Hivatal, KSH) with its large library and data collections and its Directorate for Data Processing;

the network of university libraries, especially central and departmental libraries in the technical universities and in the Karl Marx University for Economics;

the Széchényi National Library (Országos Széchényi Könyvtár, OszK) with its National Union Card Catalogue of Books and Periodicals;

the Centre for Library Science and Methodology (Könyvtártudományi és Módszertani Központ, KMK); and

the Association of Scientific and Technical Societies (Műszaki és Természettudományos Egyesületek Szövetsége, MTESz) with its Central Committee on Scientific and Technical Information and with its Department of Documentation.

An organisational scheme is given in Fig. 1.

4 THE DOCUMENTATION DEVELOPMENT PROJECT

The NCTD set up in 1962 took over the responsibility of direction of scientific and technical information on a nation-wide basis according to the government's decision. In view of the defective state of scientific and technical information in general, of the information facilities and services falling behind the objective needs of R & D & P, the NCTD soon after its inauguration decided to work out projects for the long-term development of information. First of all the problems of documentation came under revision, and the NCTD charged its Standing Committee on Documentation (Dokumentációs Állandó Bizottság, DÁB) to work out a well-based project for the development of scientific and technical documentation in the country. As a result of a working group's activity the DC presented a project to the NCTD after thorough deliberations in which many leading scientists, engi-

neers and documentation experts participated, including the President and some of the Presidium's members of the NCTD. The project has been approved by the plenary session of the NCTD in October 1963 and shall be submitted to the Council of Ministers late in 1964.

4.1 General Principles of Organisation

4.11 Responsibility

The underlying principles of the future organisation of documentation included first of all the overall responsibility of each minister directly concerned with implementing technical development in production in serving the documentation needs of all institutions attached to his ministry according to directions issued by the NCTD. The NCTD's responsibility extends to overall direction and guidance, in the first line to establish the division of labour between the various documentation organs and to some authoritative decisions necessary to insure co-ordination of documentation activities throughout the country.

It proved itself to be necessary to endow the ministers not only with responsibility in respect to their own institutions but also with national responsibility in respect to all institutions and individuals interested in the services rendered by his ministry's documentation organs notwithstanding their authoritative subordination. This new principle aims at evading unnecessary multiplication of work in documentation.

4.12 Centralisation or Decentralisation

It has no definite meaning to speak in general about centralisation or decentralisation of the organisation of documentation. No centralised organisation exists without some functions decentralised to the members of the organisation, and, on the other side, every decentralised organisation includes necessarily centralised aspects usually in more than one way. In order to characterise the organisation of documentation as centralised or decentralised, it is necessary to examine the various functions of the organisation.

It is sure that documentation services rendered for the direct use of the experts on-the-spot cannot be fully centralised, at least not in an efficient manner. The basis of the supply of information is laid on the documentation units (offices or sections or single persons) on the local level, organised in every research laboratory, industrial works, educational or other institution. This local unit has to satisfy the needs of the staff of the parent institution, and, on the other side, to report the achievements and experiences of the local staff to central documentation institutions in order to make known to others by means of the regular channels of documentation.

Besides the local services, there exist of course central documentation services as well, the use and exploitation of which can be immensely improved by the care of the local unit.

The same bifurcation concerning centralisation and decentralisation applies to documentation processing as well. Since Bradford's fundamental findings related to scattering of scientific and technical literature in journals, nobody denies - at least in principle - the advantage of centralised abstracting, whereas other forms of processing, for instance the preparation of comprehensive reviews of literature is more suited to decentralised, local handling.

The one-sided problem of centralisation versus decentralisation is better to be substituted by a fundamental problem of the organisation of documentation, namely, the division of labour between different types of documentation units. This broader terminus embraces all aspects of co-operation and co-ordination between documentation units including the notions of centralisation and decentralisation as well.

According to the Documentation Development Project the determination of the effective division of labour between the DU's on various levels and in various subject fields is one of the most important tasks of the NCTD.

4.13 Organisational level of Documentation

Another basic principle of the project consists of a three-stage organisation of documentation including a national centre, branch information offices (BIO) and local information units (LIU) (see Table 1 and 2).

The functions of a national centre shall be executed by the CTLDC under the direct supervision of the NCTD and in respect to library work under the functional supervision of the ME.

The BIO's shall be organised as departmental units in the competent research institutions or large industrial establishments equipped with research laboratories and scientific staff. The efforts for effective documentation shall be concentrated in the BIO's providing documentation services not only to institutions under the supervision of their own ministry but also to outward institutions having objective interest in their services. About 40-50 BIO's are to be set up in course of 2-3 years embracing all major fields of science and industry where documentation services are needed. To delimit exactly the field of activity of and to determine the most suitable parent institutions for the BIO's is an obligation of the NCTD in consent with the interested ministries.

The BIO's are documentation organs with a nation-wide responsibility in their special field whose task shall be chiefly documentation work proper. They should not bear any administrative responsibility for the work of the LIO's within their branch but should participate in the methodical guidance, offered to the LIO's by the ministries' CIO's.

The CIO's are to be developed in respect to documentation in the ministries' central organs for implementing the R & D & P policy of the ministry by means of the lower-stage documentation units of the ministry. Documentation activity in the ministries should be by and by decentralised into the BIO's and LIU's, the only task in this field remaining with the CIO's is the direct information of the ministries' central staff. The CIO's may of course continue and develop information work in other fields of scientific and technical information (exhibitions, films, etc.).

4.2 Chief duties of the National Committee for Technical Development and of the Information Units

4.21 NCTD

1 Working out an effective division of labour between the DU's, delimitation of their field of activity.

2 Working out directives for the development of documentation, determination of the DU's specific requirements in staff, material and finances.

3 Issuing directives for organisation and methods of documentation.

4 Elaboration of a comprehensive training system for documentation and qualification system for the staff of the DU's.

5 Recommendations regarding proposals concerning establishment or cessation of a DU.

6 Recommendations on authorisation (license) for publications containing documentation material.

7 Coordination of international relations in documentation and representation of Hungarian documentation in the international field.

4.22 CTLDC

1 LIBRARY AND DOCUMENTATION SERVICES

1 Traditional Library services provided by the Central Technical Library of Hungary.

2 Documentation services and publications, first of all central abstracting and indexing of published literature and issuing of abstracting and indexing periodicals and card services;

literature searches and subject bibliographies in every field of science and technology; and

reviews of literature on subject themes of a central importance or of a complex character.

3 Translation services in every field of science and technology and in every language.

2 RESEARCH, DEVELOPMENT AND ORGANISATION

1 Documentation of literature on information.

2 Research on basic problems on documentation especially with a view of preparations for the introduction of mechanical aids and automatic devices in all phases of documentation work.

3 Development of efficient methods and new devices.

4 Publication of materials on R & D in documentation.

5 Methodical assistance to documentation organs of every type.

6 Organisation and supervising of training in documentation.

7 Preparation of organisational directives for the NCTD and for the ministries. Assistance to the ministries in the organisation of their network of DU's.

8 Developing the newly organised National Film Information Centre.

9 Preparation for extending the CTLDC's field of activity to other forms of information besides documentation and films.

3 AUTHORITATIVE FUNCTIONS

1 Management of the National Register of Translations and issuing permits to applicants for translations.

2 Any other functions to be delegated to the CTLDC by the NCTD.

4.23 CIO (of a Ministry)

1 Organisation, coordination and control of the work of all documentation organs attached to the ministry according to the directives issued by the NCTD.

2 Planning and evaluation of the work of the network of DU's.

3 Permanent control of the effective use of documentation in the central organs, research institutes, industrial establishments and other institutions of the ministry.

4 Providing direct library and documentation services for the central staff of the ministry.

5 Organisation of publishing information materials especially trade catalogues, etc.

6 Development of central and local information facilities in other forms of information apart from documentation.

4.24 BIO

1 Exhaustive organisation of scientific and technical literature of all kinds relating to the branch's needs and forming a central stock of literature and data.

2 Highly differentiated library and documentation services for all interested institutions and individuals utilising efficiently the service facilities offered by the CTLDC, the other BIO's and any other documentation organ at home and abroad in addition to the own documentation processing activity, with special emphasis for detailed reviews of literature embracing scientific, technical and economic aspects as well.

3 Publication of all kind of information materials especially literature reviews, trade catalogues, reports on research work, on experiences and results achieved in institutions and industrial works belonging to the branch.

4 Assuming the functions of a LIU in regard to the parent organisation.

5 Methodical guidance and assistance to the branch's LIU's.

6 Assistance to the CIO in the control of the effective use of documentation within the branch.

7 Development of information activity in other forms of information apart from documentation.

4.24 LIU

1 Selective acquisition of scientific and technical literature of all kinds relating to local needs and forming a local stock of literature and data.

2 Highly differentiated library and documentation services to the parent institution with a minimum effort on documentation processing and efficiently relying upon documentation services of other institutions at home and abroad.

3 Organisation of an information network with information officers appointed in each major department, workshop, etc.

4 Guidance to the information officers and other staff workers in preparing reports and other materials describing results and experiences found in the parent institution.

5 Presentation to the competent BIO of all documents prepared by the parent institution's staff on results and experiences.

6 Control of the effective use of documentation.

7 Development of information activity in other forms of information apart from documentation.

4.3 Finance and Personnel

The estimated costs of the Development Scheme scheduled for the next five years amount to raising the present level of yearly expenditure in acquisition costs, salaries and overhead costs in the relation of 2 : 1 in the case of the CTLDC and the CIO's, and in the relation of between 4:1 and 5:1 in the case of the ministries' documentation sub-networks. Besides these cost elements, the Project provides for directives concerning

a) the most important reprographic machinery and equipment for the documentation organs on the various levels; and

b) investments for suitable location, reaching and working facilities for the national, central and branch units.

Similar growth rates of 2:1 and 4:1 or 5:1 are provided for the personnel of the national, branch and local units, taking into consideration first of all the establishment and development of the BIO's. There is a need for high-qualified experts to be invited to work in documentation. As these experts cannot be expected to leave in hundreds their existing jobs and take over jobs in DU's, a solution must be found in receiving assistance from these experts and their respective institutions on a basis of part-time work or home work, though a limited number of full-time experts is absolutely necessary for the quick and safe development of documentation in respect to quality as well as to quantity.

The goals set by the figures showing the increase and qualification distribution of the personnel determine the future development of training of the documentation personnel. A separate Documentation Training Development Project has been elaborated on the basis of the requirements set out in the Documentation Development Project.

4.4 Directives for improving the Utilisation of Documentation

4.41 Control and Evaluation

Documentation is not an end in itself; on the contrary it has to be one of the most important tools directed towards the development of the country, first of all towards the scientific and technical development. Out of this follows that the general functions, tasks, concrete methods, techniques as well as the organisation of documentation has to be determined by the requirements of economic development, first of all by the demands of scientific and technical development.

This has to be specifically stressed upon because of at least two reasons. First of all, it is a well-known fact that literary production has already reached too vast quantities to be easily controlled by traditional methods of documentation and, moreover, the yearly increase of literature exceeds the measures up-to-date documentation methods can cope with. The second - and not less important - reason consists in the fact that the means at disposal for documentation are limited, so that we are forced to organise our work in a most efficient manner.

Now there arises the question, what is to be meant by efficient. Efficiency in general means the results, the output of an action related to the corresponding input. It is quite clear that it is impossible to measure the efficiency of documentation directly. The results of documentation present themselves only after a time-lag and through a transformation into achievements in R & D & P. It is rather doubtful if the efficiency of documentation in general could ever be calculated. That does not contradict the possibility of determining the effectiveness of single measures based upon hints received from information materials prepared by some documentation centre or unit nor does it disprove the possibility to recognise the trends in improving or hampering efficient utilisation of the documentation services.

The Documentation Development Project prescribes therefore directly to the CIO's of the ministries to control and evaluate permanently the utilisation of documentation services throughout the institutes, works and other organs attached to the ministry. In this activity the CIO's are to be supported by the BIO's having a direct feeling with the users in all institutions within their branch. The principles and methods of such control are to be determined by every ministry independently.

4.42 Users' Differentiation in Documentation Services

The striving at maximum effectiveness, the manifold needs of the users (actual and

potential) have to be taken into consideration. Documentation has to be selective and specialised, ready-tailored to the information needs of scientists, engineers, economists and other experts. These needs originate in the user's position, job specialisation, field of activity, qualification, experience, etc. as listed in Table 3. The task of supplying documentation to a Chief of Department in the Planning Commission, dealing with problems concerning investment planning in any branch of the fuel industry is quite different from supplying documentation for instance to a research worker with a background of chemistry and physics of ceramic materials engaged in research in electrical insulation or to a plant engineer having to run an independent workshop with say 1,000 workers and having or having no experience in works and job organisation. How differentiated the real circumstances are is shown by the fact that for instance, out of the whole group of mechanical engineers only 22.5% were engaged in the engineering industry, other 13.8% held jobs in governmental offices, research and education institutions and 11.8% in building industry in 1960, on the other side the technical staff of the chemical industry was composed of 69% of chemical engineers and 23% of mechanical engineers.

4.43 Measures for Improving the Utilisation of Documentation

4.431 Direct Measures

Direct measures promoting the use of documentation may be taken first of all in industrial production where new results described in documentation services are to be applied directly. It is a specific obligation of the LIU's and BIO's to consider the possibilities for the direct and quick application of new information, to prepare analysis and suggestions for the effective utilisation of literature and to exercise regular control over the fulfilment of these suggestions. The CIO's are responsible for the working out of suitable methods and for the overall direction and control of utilisation.

Direct measures of another type consist of compulsory prescriptions regarding the use of literature reviews and search reports in connection with far-reaching economic decisions. The Documentation Development Project provides directives for prescribing the working out and the consultation of comprehensive and detailed literature reviews in the following phases of R & D:

Determination of targets to be included in R & D projects;

ratifying R & D plans;

preparation of progress reports and final reports on R & D projects;

evaluation of a new construction's prototype;

introduction of a new technological process;

application for import licenses; and

application for and decision of investments.

Reviews for these purposes shall reveal the top achievements throughout the world in general and the state of scientific and technical achievements in the countries being of interest in regard to the theme of the project. No decision should be taken without prior consultation of these documentation materials.

4.432 Indirect Measures

The reviews should be prepared by the DU's drawing the competent experts into this activity. By this a complementary effect may be achieved in addition to the direct measures for improving the utilisation of documentation. Experts working in R & D & P will develop a better understanding for documentation and will have a better opportunity to propagate the use of documentation in their institutions and expert circles. This subjective approach is not to be underrated as any individual approach to documentation is necessarily highly subjective.

As it is to be seen, indirect measures for the improvement of utilisation of documentation strive at the enlargement of the experts' capacity to receive information. Training in documentation is supposed to be the major key to this end.

Scientists, engineers and other experts usually have only very vague knowledge of documentation and are not in a state to appreciate the advantage they might take of documentation methods and services. Efficiency of documentation could strongly be improved

if.the potential users knew where and how to ask for and how to use documentation.

It is out of this reason that university and college students should be made to know the elements of documentation. They should be obliged to take a compulsory course in documentation for two semesters. The introduction of such courses at the Technical University of Budapest is in preparation.

As to informing and teaching practicing experts on documentation various other possibilities exist, for instance special courses or lectures are given by the CIO's or BIO's. Recently the Institute of Post-graduate Education of Engineers, Budapest organised two courses for engineers dealing with methodology and organisation of documentation. Each course was attended by forty engineers.

5 CONCLUSIONS

A small country with limited resources is faced with nearly the same volume of scientific and technical documents published all over the world as any big country with ample resources. But the task is in some cases aggravated by language difficulties which are more likely to arise in small countries than in larger ones playing a major or leading role in many branches of science and technology. Apart from that particular feature of the language problem specific to Hungarian conditions, out of the course of development of documentation in Hungary some conclusions may be drawn for the development of documentation in developing countries.

5.1 Documentation is an organic part of R & D growing into an independent activity of literature experts including librarians, bibliographers, information officers and high-qualified experts of various professions.

5.2 The organisation of documentation as a part of R & D lies within the responsibilities of the governments and should be based upon the organisation of R & D in the country.

5.3 Documentation must be strongly differentiated according to the obvious or latent needs of the various categories of users.

5.4 To wake up latent but objective needs in documentation is one of the most important tasks which the organisation for documentation has to face. Outside experts participating in various phases of documentation processing and services can be the best allies in that campaign amidst their collaborators in scientific and technical institutions.

5.5 Documentation has to be taught to and learned by all experts who work in documentation processing and services and who simply use documentation services.

5.6 Development in documentation has to be planned carefully and incorporated into the national plans of development.

Table 1: Distribution of Functions between Governmental Bodies and Documentation Organs on Various Levels.

Function	National level					Ministerial and local level			
	NCTD	NCTD DC	CTLDC	ME	ASTS	Minister	CIO	BIO	LIU
General direction	x	-	-	-	-	-	-	-	-
Administrative direction and supervision	x2/	-	-	-	-	-	x1/	-	-
Functional supervision	x	-	x1/	x3/	-	x	x1/	-	-
Direction in methodics	x	-	x1/	-	-	-	x	x	x
Information work									
Documentation	-	-	x	-	x	-	x	x	x
Other	-	-	x5/	-	x	-	x	x	x
Research and development	-	-	x	-	-	-	x	-	-
Training	x	-	x1/	x	-	-	x	-	-
Organisation	x	-	x1/	-	-	x	x1/	x	x
Authority gestures (authorising etc.)	x	-	x1/	-	-	x	x1/	-	-
Advisory functions, expertise	-	x	x	-	x	-	-	-	-

1/ By delegation. - 2/ In respect to CTLDC. - 3/In respect to special libraries. - 4/Conferences, exhibitions, scientific and technical films, broadcasting, television etc. - 5/A special Film Information Centre set up with CTLDC.

Abbreviations:

NCTD = National Committee for Technical Development.
DC = Documentation Committee.
CTLDC= Central Technical Library and Documentation Centre.
ME = Ministry for Education.
ASTS = Association of Scientific and Technical Societies.
CIO = Central Information Offices of the Ministries.
BIO = Branch Information Offices of the Ministries.
LIU = Local Information Units in research laboratories, industrial works etc.

Table 2: Distribution of Work and of Responsibilities between Documentation Centres and Units on various Levels

	Published[1] literature (books, periodicals, etc.)			Unpublished[2] literature (reports, trade literature, etc.)		
	National	Branch	Local	National	Branch	Local
		level			level	
Acquisition	Selective	Exhaustive	Selective	-	Exhaustive	Selective
Processing						
Library processing		According to holdings				
Bibliographic listing	Exhaustive[3]	-	Selective	-	Exhaustive	Selective
Abstracting	Selective[4]	-	Highly selective[8]	-	Selective[5]	-
Reviewing	Selective[6]	Selective[7]	Highly selective[8]	-	Selective[7]	-
Translating	All-embracing[9]	Selective[10]	Selective[10]	All-embracing[9]	Selective[10]	Selective[10]
Services[11]						
Special bibliographies	All-embracing	Selective	-	-	Selective	-
Literature lists	All-embracing	Selective	Selective	-	Selective	Selective
Abstracting & indexing journals and card series	Selective[4]	-	-	-	Selective[5]	-
Reviews of literature	Selective[6]	Selective[7]	Highly selective[8]	-	Selective[7]	-
Translations	All-embracing[3]	Selective[10]	Selective[10]	All-embracing[9]	Selective[10]	Selective[10]
Technical services (reprography)		According to needs and means.				

1) Commercially available. - 2)Commercially not available. - 3)Central listing of new acquisitions. Partly fulfilled by a central list published since 1962 by the Szechenyi National Library, Budapest in two parts; Science and Technology; Social Sciences and Humanities. - 4)About 100,000 abstracts per year embracing most branches of science, technology and industrial economics. - 5)The necessity of abstracting is not yet cleared. - 6)Subject themes of central importance or of a functional character, f.i. general questions of research organisation, scientific and technical education, mechanisation and automatisation of production processes, etc. - 7)Subject themes of branch importance. - 8)Subject themes of local importance. - 9)Central Bureau of Translation. - 10) Compulsory central registration of translations. - 11) National and branch services for country-wide use; local services for local use only.

Table 3: User's position, job specialisation, field of activity etc.

1. Administrative level differentiation

Ministries
Planning Committee
Ministerial Departments
Ministerial Committees
Research institutions
Educational institutions
Industrial establishments etc.

2. Hierarchical differentiation

Director
Manager
Chief of Department or Section
Chief of Laboratory
Chief of Works
Chief of Workshop
Technical Officer
Administrative Officer
Foreman etc.

3. Differentiation according to job specialisation in Research, Development and Production

Research Work
- Basic Research
- Applied Research
- Experimentation
- Measurements etc.

Development
- Construction of new apparatus
- Working out new technological processes
- Investment and renewal
- Scientific and technical documentation
- etc.

Industrial Production
- Workshop practice
- Production planning
- Production control
- Plant engineering
- Power and heat supply
- Maintenance, repair
- Safety etc.

Labour Management
Planning, Accounting and Finances
Organisation etc.

4. Differentiation according to field of activity

Mining
- Fuel
- Ore
- Minerals etc.

Energy Supply
- Power production and transmission
- Gas production and transmission
- Heat (Steam) production and transmission
- etc.

Metallurgy
- Pig iron
- Steel
- Other metals
- Foundries
- Rolling mills
- Forgeries
- etc.

Engineering
- Production of machinery for transformation and transmission of energy
- Production of machinery for transformation and transmission of material
- Production of consumer goods

Chemical Industry
.. .. ..

Building Materials Industry
.. .. ..

Paper Industry
.. .. ..

Light Industry
.. .. ..

Food Industry
.. .. ..

etc.

5. Differentiation according to qualification of the user

Science
- Mathematician
- Physicist
- Chemist
- etc.

Engineering
- Mechanical engineer
- Electrical engineer
- Chemical engineer
- Mining and Metallurgy Engineer
- Public Works Engineer

Economics, etc.
- General economics expert
- Industrial economics expert
- Planning expert
- Financial expert
- Foreign trade expert
- etc.

FIELD DOCUMENTATION:

A TECHNICAL REPORT ON INSDOC - NML PROJECT

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1 INTRODUCTION

For the first time Insdoc launched on what is known as Field documentation. It consisted in conducting a new experiment by setting up a Central Information Index using Universal Decimal Classification. For this purpose a team was sent to National Metallurgical Laboratory, Jamshedpur. The organisational details have been described elsewhere in a separate report. This attempts to present the technical aspect of the work involved in the experiment.

1.2 In situ Documentation

Documentation service rendered at the point of actual consumption may be termed as in situ Documentation. The Central Information Index is an example of in situ Documentation. Such a service functions in close cooperation with the scientists and research workers. It is tailored to their immediate needs. It is modified by their feedback.

1.3 Scope of the Project

1 to rationalise the practices followed by the scientists working in the Laboratory for compiling literature references for their use;

2 to pool their efforts in the selection and preparation of abstracts of articles relevant to their projects;

3 to compile a Central Information Index comprising of the references selected and abstracts prepared by the scientists relating to their projects;

4 to classify the entires minutely according to UDC for arranging them; and

5 to prepare an analytical subject index, using chain indexing technique for preparing subject entries.

2 SUBJECT

The documents in metallurgy - mostly articles appearing in scientific and technical periodicals - are multifocal, and multifaceted. The following table represents the occurrence of facets in a preliminary subject analysis of a random sample of 300 articles in the field of metallurgy:

Table 1

No. of Facets	No. of articles	% of articles
1	-	0
2	4	1.3
3	32	10.6
4	124	41.3
5	90	30.0
6	40	13.3
7	5	1.6
8	4	1.3
9	1	0.3
Total	300	

Thus, from the above table it is clear that majority of the articles present four facets. 71% of the articles presented four to five facets (Table 1). It can be safely inferred that a classifier has to be prepared to accommodate four to five facets in the class numbers assigned by him.

3 CLASSIFYING

It was found helpful to analyse articles and synthesise this result of facet analysis to get the Class Number. This method gave enormous consistency over a range of 2,500 assorted articles.

Our experience shows that a trained classifier can classify and check six articles per hour, on the basis of the turnover of two classifiers for eleven days. The initial take

off period is three days. In this period familiarity with the schedules and with the ramifications of the subject metallurgy is acquired. The average curve smoothens and appears to be stabilised with the average production of 40 entries.

4 CLASSIFICATORY PROBLEMS

For efficient indexing it becomes necessary to assign coextensive class numbers to the documents or articles. This becomes all the more necessary as the primary purpose of classification at micro stage is to throw the entries in an helpful sequence – a sequence from which it becomes possible to retrieve a group, howsoever deep, with minimum of noise factor.

4.1 Coextensive Class Numbers

All articles were minutely classified giving co-extensive class numbers. Most of the articles treated a combination of subjects demanding multifaceted numbers. In UDC we have to use large blocks of numbers to represent the subjects. UDC does not prescribe any fixed sequence for these blocks or facets. It provides for alternative placings for each of these facets. This implies at least four entries for a four-faceted subject, five for a five faceted subject and so on. Most of the articles in metallurgy consisted of four to five facets. For 2,500 articles, we would require more than 10,000 entries. With the increase in the number of articles, the size of the Central Information Index would increase enormously and its size alone would hinder its usefulness. In order to avoid this shortcoming, it was decided to give only one entry for each article, instead of many entries for the various aspects. To make this effective, it was necessary to fix the sequence of the facets in a class number and provide for all the alternate approaches through analytical subject headings.

It was not possible to assign coextensive class number to each and every document. The following table shows the results of the attempts to arrive at coextensive class numbers in a representative sample of 300 articles.

Table 2

No. of Facets	No. of articles	No. of articles having co-extensive Cl Numbers	Percentage of articles to which coextensive Cl No. could be assigned
1	-	-	-
2	4	3	75
3	32	18	56.2
4	124	51	39.8
5	90	27	30
6	40	11	27.5
7	5	-	-
8	4	-	-
9	1	-	-
Total	300	110	36.6

Table 2 represents the distribution of the articles for which coextensive class numbers have been assigned. It will be seen that with UDC, it has been possible to assign coextensive class number fairly satisfactorily to those articles presenting upto four facets.

4.2 Limitations

The limitation in representing all the facets in a class number i.e. in designing coextensive class numbers is traceable to two causes. First cause is that a classifier has to grapple with the wave front of knowledge where everything is transient. New concepts appear as if they are not settled in relation to the subject. Hence although it is possible to spot a new facet in an article, it becomes very difficult to ascertain its proper relationship with other facets. Second cause is due to shortcomings of the schemes. UDC failed on two counts. One was that many of the isolates were not enumerated. It is not possible for any scheme to enumerate future isolates in any subject. The second reason was that with the increase in the number of facets the corresponding coextensive class number becomes too long - so long that it distracts the attention of the user.

4.3 Compromise

The efficiency in the Central Information Index was obtained with the aid of compromise between co-extensiveness on the one hand and length of class number on the other. Verbal extension was freely used to sharpen the isolates. One such case was 'Impact

extrusion'. The enumerated isolate in the schedule was 621.77 Extrusion, rolling etc. The verbal extension method gave the isolate number for Impact Extrusion as 621.77 [1]. Thus the class number was made coextensive without increasing the length proportionately. The other method was to strike a balance between the class numbers and subject-index. By this, the number of facets were deliberately kept under six and the rest of the facets were delegated to the subject index. It must be pointed out that these practices mark a definite departure from UDC's conventions. Just to give an idea of the length of class number an example is quoted below:

622.765:622.775:622.343.5:66.094.3:
669.537.015.9

Author KLEBONOV (O B) et al.

Title Use of "clinker" of electrolytic zinc plants for precipitation of copper in beneficiation of oxidised copper ores by the combined system.

Citation Tsvetn. Metal. 35, No. 11, 1962, 36-37.
(Chem Abs. 58(13)24 June 1963, 13495 a)

Abstract

Zn plant "clinker", contg. Fe total 32.5 and Fe metallic 31.6%, and its magnetic concentrate replaced satisfactorily Fe sponge and filings as a Cu precipitant in the treatment of oxidized CU ores by the leaching-cementation-flotation method. Overall Cu extn. into the intermediate produce increased to 78, and into finished Cu concentrate to 69%.

4.4 Problems in UDC

The printed schedules of UDC (BS 1000: 1949, 669 Metallurgy) presented many problems. These problems manifest themselves acutely when an attempt is made to assign a co-extensive class number to a document.

4.41 Long Class Number

Many articles called for long class numbers. One such case is cited in sec 4.3 as an illustration. Many factors add to the length of the class numbers. The use of relation sign i.e. colon as a means of sharpening an existing isolate is one such factor. One has to resort to this method owing to lack of enumeration.

There were many cases that called for the isolate numbers both from 669-1/-9 and 669.01/.09. Since there appears to be no provision of using these isolate numbers in one and the same class number consecutively, the use of colon is inevitable. Thus the class number for

"Conditions of dissolution and removal of oxygen during deoxidation of metal Armco Fe melts".
669.14.018.264:669-154:669.046.553:669.787

This article calls for the use of as many as three analytical subdivisions of 669. One is forced to use colon and thereby increase the length of class numbers. Whereas had there been a provision for using these analytic subdivisions without repeating 669 and using a colon the class number would have been reduced to:
669.14.018.264-154.046.553:669.787

resulting in an economy of six digits. Here 0 and hyphen serve only as connecting symbols. This definitely is as coextensive a class number as the earlier one, with lesser number of digits. There were many such cases.

4.42 Facet Sequence

In the example quoted in sec 4.41 the same class number could be written in 24 different ways

a) 669.787:669.14.018.264:669-154:669-045.553

b) 669-154:669.046.553:669.787:669.14.018.264

c) 669.046.553:669.787:669.14.018.264:669-154 .... and so on.

There is every likelihood of similar documents being scattered in different information indices and within the same index at different times. This sort of scattering can be avoided if UDC provides an objective guidance for facet sequence.

4.43 General Vagueness

A case was that of aluminising of steel and iron. There are alternatives provided in the schedule. These are as under

669.198 Coatings on, or with Iron & Steel.

669.718.6/7 Coatings of other metals with aluminium.

4.44 Sharpening of existing subdivisions

In the absence of any guidance for sharpening any existing isolate number, the only alternative left to classifier is to use colon and then a chunk of numbers. This method is well illustrated in the schedules. This method presupposes that a new concept calling for a new isolate number is not actually a new concept but in fact a hybrid concept whose components are already enumerated somewhere else in the schedules. No synthetic number could be got for "Impact Extrusion" even by this method. The nearest number enumerated was 621.77. There were two alternatives. One was to classify all articles on Impact extrusion, and we had compiled a bibliography of nearly 120 articles, under 621.77. By doing this in a Central Information Index, which cumulates continuously we would have jeopardised the chances of subsequent retrieval of articles on Impact extrusion. At least there would have been a considerable noise factor. The other was to ignore the general directions of UDC and find some device to extend 621.77 in a way that it does not come in conflict with future expansion of UDC. The device used was that of "verbal extension", e.g. 621.77 [1] for Impact extrusion. But this device too has a limited use. It was failing even in this case. Articles on cold impact extrusion had to be separated from other articles on Impact extrusion in order to minimise the noise factor at the retrieval stage. The only alternative left was to use alphabetical device or to subdivide 621.77 [1]. The former was preferred. Another case was when a number had to be found out for "slugs". The nearest enumerated number was 669-412 Ingots. slabs etc. 669-412 [1] slugs was used. The absence of general principles for sharpening the existing subdivisions was felt throughout our work.

4.45 Two Uses of Colon

It was found at the stage of arrangement of entries that colon has been used in two ways. One as a means of sharpening an enumerated subdivision. The other use is that of showing relations between two class numbers. The filing position of colon has been defined. It is in the former use that the arrangement becomes from specific to general instead of from general to specific. In this case the enumerated isolate numbers appeared later than that of synthetic isolate numbers. It became impossible to rectify this without separating the duality of colon. And it was not attempted.

4.5 UDC Practice

UDC appears to advise against the construction of long numbers. It may be remarked that the length of the number cannot be shortened by instructions alone, as the length of any class number is not a function of a scheme only. It is more closely related to the subject of a document. Another suggestion is to use relation sign (:) colon between two or more facets, to make as many copies of an entry as there are facets and file one copy under each facet. This is an ideal solution when the number of facets presented are two. For metallurgical literature, as stated earlier, majority of articles present 4 facets, and keeping four copies of every entry makes the index unwieldy. In fact for incorporation of 2,500 entries in the Index, the team would have had to prepare 10,000 entries in the classified part. Considering the labour involved, it was decided to have one entry per article in the main classified part of the index. The other approaches were to be satisfied by the subject index. This was another point of departure from the set practice of UDC which yielded an economy of 7,500 cards.

4.6 Unsolved Problems

It was difficult to reflect the relationships in the class numbers. The normal relations sought were utility, raw materials, property, process and equipment. The chunks represented these facets but did not indicate their relationship. In other words, the class number did not say whether 669.71 is a semi-finished or raw aluminium. However, the following principle gave enormous consistency:

Utility, Raw Material, Property, Process, Equipment

A similar problem came up in the field of chemical estimation. Here too, we put

chunks of numbers representing the substance analysed; the type of analysis and the element estimated. These facets representing the element or metal that has been estimated, the facet representing the method of estimation and the facet representing the sample. It became difficult to ascertain the sequence of facets from discussion. An 'ad hoc' sequence was followed and is given below:

Sample, method of estimation, element estimated.

Even in this, it was the 'sample' facet that gave considerable difficulties. One difficulty that could not be solved was "estimation of certain element in presence of other elements in a sample".

5 FEATURING

The classified part has to be duly featured. Co-extensive class number was given as far as possible for each entry of an article. All the entries were arranged strictly according to these class numbers. For feature headings, instead of using the co-extensive class numbers in full, only broad numbers followed by appropriate verbal extensions were used. All the verbal extensions following the same class number were arranged according to their subject filiation as represented by their full class numbers and not according to the alphabetical sequence of the verbal extensions. For analytical subject entries, for ease of location, only broad class numbers followed by verbal extensions were given. The above procedure, while securing the advantages of a completely classified arrangement of entries minutely classified, enables easy reference by using short class numbers followed wherever necessary by verbal extension. The purpose of class numbers is to mechanise arrangement as well as to enable expeditious retrieval. Minute classification naturally tends to give long class numbers which though helpful for arrangement are not helpful for retrieval. An attempt has been made in this project to secure efficient retrieval by using short class numbers with verbal extensions as location numbers for subject headings. This approach has provided good results in two of our demonstrations. A deviation from the normal method of preparing a feature card was felt necessary. This deviation was on account of the explicit realisation that storage mechanism is more or less independent of retrieval mechanism, and all the intricacies of storage mechanism need not be reflected in the retrieval mechanism. Hence it was decided to have only 10 to 12 digited class numbers on the feature headings. These feature heading cards were termed as main feature cards. Deeper feature headings carried no class numbers but only the terms. Their position was of course determined by the class numbers. These were called as sub-feature headings or merely sub-headings. Each main feature card gave the arrangement of sub-headings. Thus a main feature card looked like:

669.14 STEEL
Sub-headings are arranged as:
Mechanical property
Embrittlement
Solution
Analysis
Testing

Class numbers on the feature cards serve no purpose other than their replacement in the classified part. A reader, who has changing interests, is allergic to long class numbers.

The method of featuring followed is a synthesis of verbal extension and chain procedure. It has three advantages:

1 It does not load each feature heading with long and complicated class numbers;

2 It makes the location in the classified part comparatively easy; and

3 Readers' attention is less distracted.

6 SUBJECT INDEX

The alphabetical subject index to the Central Information Index was made on 75 x 125 mm cards. As far as possible the entries for the subject index were derived by chain procedure. On account of majority of non-coextensive class numbers, it became necessary to scan the abstracts to the articles and select ideas not covered in the class number.

A deviation had to be made in respect of index numbers. Normally the index number should be the class number. But as it became so unmanageably long that it lost its value as index number. Therefore, the index number did not indicate any specific article but it

referred to the group containing the article. The directing element had to be changed from 'see' to "See under".

6.1 Illustration

The following examples show the mechanism and the departure from the set practices of chain procedure for preparing a subject index:

Terms used	Actual number	Index Number used
Cast iron	669.13	669.13
Grey cast iron	669.131.6	669.131.6
Inclusion, Grey cast iron	669.131.6:620.192	669.131.6 (Inclusion)
Slag inclusion, Grey cast iron	669.131.6:620.192:669.046:58	669.131.6 (Inclusion)
Microscopy, Slag inclusion, Grey cast iron	669.131.6:620.192:669.046:58:620.186	669.131.6 (Inclusion)

7 ASSESSMENT OF WORK LOAD

The work relating to the Central Information Index falls into the following categories:

1 Selecting relevant references and abstracts relating to project;

2 Preparation of abstracts wherever necessary;

3 Typing of references and abstracts on standard 125 x 200 mm slips;

4 Comparison of typed slips;

5 Classification of the entries;

6 Preparation of subject index entries and compilation of authority list;

7 Classified arrangement of the entries and preparation of the feature headings;

8 Alphabetical arrangement of subject entries; and

9 Maintenance of Central Information Index.

The work relating to the first two items is done by scientists working on the various projects. The work pertaining to items 4 to 9 is to be done by trained documentalist. The typist does the work pertaining to item 3. He has to be trained for this job. On an average a typist can type 10 abstracts or 20 references per hour. The work pertaining to items 5 and 6 falls within the purview of documentalist. Even though there is bound to be some increase in the output as the documentalist gains experience and gets familiarity with the subject and classification procedure, a steady state in the output is reached fairly early. Maintenance jobs entail a routine of checking up the classified sequence, the alphabetical sequence and replacing worn out entries. This has to be done daily.

8 CONCLUSIONS

The majority of the articles in metallurgy called for the use of five facets only. Out of these a four-faceted class number could accommodate the maximum number of articles. This experiment points to the necessity of studying the problem of indexing in its entirety. The experiment gave a valuable experience. The time for conducting similar experiments in other fields of knowledge has arrived.

9 ACKNOWLEDGEMENT

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DIRECTORY OF INDIAN SCIENTIFIC PERIODICALS 1964*

T N RAJAN
Insdoc, Delhi-12.

The Directory of Indian Scientific Periodicals just published by INSDOC is an important addition to the Indian reference books. It contains a list of seven hundred and twenty five scientific periodicals current upto the end of 1963, including annual reports of scientific and technical institutions. This gives a measure of the scientific activity in the country.

Development of Scientific Research

It may not be out of place here to outline in brief the evolution of scientific periodicals in India. The origin and growth of the publication of scientific periodicals in India almost synchronise with the establishment and development of scientific institutions and societies. Modern scientific research in India begins with the founding of the great Asiatic Society in 1784. The research findings of the Asiatic Society were recorded in the Asiatick Researches, the first Indian periodical published in 1788. In 1832, when James Prinsep was the secretary of the Asiatic Society, the title of the periodical was changed to the Journal of the Asiatic Society of Bengal, amalgamating Gleanings in Science which appeared in 1829 as a venture of James Dowland Herbert, Deputy Surveyor General.

The Madras Literary Society was founded in 1818 and was incorporated with the Madras Auxiliary of the Royal Asiatic Society. The organ of the Society, Journal of Literature and Science ran into seventeen volumes between 1833 and 1894.

Towards the end of the nineteenth century a good deal of scientific work was being done in the surveys and departments of Government, and in some private societies. Medical research was organised in 1896. The Medical and Physical Society of Calcutta was formed in 1823 and its Transactions which began publication in the same year, was the first professional medical periodical published in India. A number of other medical journals were started during the century.

The Agricultural Society of India was established in 1820. In 1823, its name was changed to the Agricultural and Horticultural Society of India and it published its Transactions and a monthly journal.

The Bombay Natural History, Society, founded in 1863, publishes a journal since 1866.

The establishment of the great Trigonometrical Survey in 1818 (which in 60 years became the Survey of India), the Geological Survey of India in 1851, the Botanical Survey of India in 1899 and a few other such organisations contributed a great deal to the growth of scientific work in India, publishing their own periodicals.

Five universities were established during the nineteenth century; but these were only affiliating universities mainly concerned with the conduct of examinations and awarding degrees and not much research activity was there until the beginning of the twentieth century.

But with the reorientation of university education resulting in the increased facilities for postgraduate teaching and research, the tempo of scientific research was increased considerably in the twentieth century. As a natural consequence, publication activity also showed a corresponding increase and many universities started publishing their periodicals. There are more than fifty universities to-day and most of them have their own periodicals.

Another important and significant development during the period was the emergence of specialised institutes established both on private initiative and by government. Medicine and agriculture received special

*Directory of Indian scientific periodicals, 1964. New Delhi, Insdoc, 1964. Pp 133.

attention. The Indian Council of Medical Research (ICMR) in 1911, the Indian Council of Agricultural Research (ICAR) in 1929 were established to take care of medicine and agriculture respectively.

In the early decades of the twentieth century, scientific societies and associations of general and specialised types began to be formed, mainly for meetings and conferences. The Indian Mathematical Society (1907), the Institution of Engineers (1908), the Indian Psychoanalytical Society (1922), Bio-chemical Society (1934) are a few among the specialised types of societies. The publication of journals was one of the important activities of most of these learned bodies.

Among the associations of a general type, the Indian Science Congress Association, established in 1914, has been organising annual sessions ever since. The Proceedings are in three parts, the last one covering the abstracts of papers submitted at the Conference. The United Provinces Academy of Sciences was started in 1930 which was renamed the National Academy of Sciences (Allahabad) in 1936. The Indian Academy of Sciences (Bangalore) was established in 1934 and the National Institute of Sciences (New Delhi) in 1935. All these have their own periodicals.

With all these development, it became imperative to have an organisation to coordinate scientific work in the country. There was also the urgent need for rapid industrial production to meet the requirements of the Second World War. In response to these, the Council of Scientific and Industrial Research was brought into existence in 1942 and it soon established a number of National Laboratories. With the advent of independence, scientific research in the country received a tremendous boost and today there are as many as thirty-four National Laboratories and Institutes, each one devoting itself to a specialised field. The Council of Scientific and Industrial Research brings out six research journals and most of the National Laboratories and Institutes publish their own periodicals.

The Defence Science Organisation, established in 1949, has a chain of laboratories in the field of defence science and publishes its journals.

The Atomic Energy Commission was established in 1948. The Atomic Energy Establishment, Trombay, established in 1957, has been the national centre for research and development in the field of atomic energy. It publishes a documentation periodical and a few others which are primarily for internal use.

So, it is only the fitness of things that the Directory of Indian Scientific Periodicals is published now, as the "first step towards the consolidation and servicing of scientific communication in this country". It is also stated in the "Introduction" that the Indian Current Science Abstracts will be the logical consequence of such a step".

Although, nothing has been said regarding what exactly will come under the scope of "scientific periodicals", it can be seen from the directory that it includes not only periodicals of the traditional discipline of sciences but also subjects like Psychology, Metrology, Architecture and Industries, etc. But this only extends the value and use of the Directory.

No criteria has been mentioned for the selection of periodicals, but "periodicals of merely news interest and 'popular' in the newspaper sense of the term have been omitted." The inclusion of about one hundred and twenty annual reports of research institutions in the country enhances the use of the Directory, as reports from one of the important source material for research.

The majority of periodicals listed in the Directory are obviously in the English language, but a select list about sixty periodicals in the regional languages of India, one in French and half a dozen bilingual ones are also included. Hindi tops the list in the number of Indian language periodicals and the other languages are Marathi, Gujarati, Telugu, Bengali, Kannada, Tamil and Urdu. It is stated that "a scrutiny of the Indian language periodicals show that the main attempt on the part of the editor was to popularise science". However, mention must be made of the Hindi periodical "Vijnan Parishad Anusandhan Patrika" which publishes research papers of high quality.

The entries have been arranged by the UDC and also serially numbered.

The Directory has been compiled in accordance with the recommendations made by UNESCO (Unesco Bulletin for Libraries 1961, 15(2), 91-94) for the preparation of such directories. Each entry contains infor-

mation in the order given below:

1 Title. Its standard abbreviations for which the World List of Scientific Periodicals published in the year 1900-1950 has been followed.

2 Language symbols of non-English and multilingual periodicals

3 Year of first publication wherever available.

4 Address of the publishing body and/or sponsoring or editorial organisations.

5 Contents and nature of articles. Following particulars are listed here: Abstracts or index of articles, Author's summary (or synopsis), Book reviews, Informative articles, Notes & News, Original articles, Popular articles, Patent information, Research reports, Statistical data, Short communications, and Standard specifications.

6 Frequency of publication

7 Rate of subscription in Indian and foreign currency wherever available.

8 Information as to where the periodical is indexed and abstracted.

Information regarding "contents and nature of articles" in periodicals is particularly noteworthy. This will facilitate considerably the international abstracting and indexing agencies in giving a more adequate coverage to worthwhile Indian periodicals. This will also be very useful in building up Indian periodical collection in Indian as well as foreign libraries.

The indication of the inclusion of "Book Reviews" in periodicals will help the process of book selection in libraries. The novel way of indicating the frequency of publication by a fraction, the numerator of which denoting the number of issues per volume, and the denominator indicating the number of months for which a volume runs, is interesting. This takes care of the problem of mentioning the periodicity of a publication whose frequencies are somewhat odd.

A fairly representative list of documentation periodicals are given wherein the Indian scientific periodicals are indexed or abstracted. The importance of giving this information needs no elaboration.

There is a title index given at the end which refers to the serial number of the periodical in the classified part of the directory. Under "Reports" all the annual reports of research institutions are collected together for easy reference. There is no subject index. Perhaps, the utility of the directory would have increased if a subject index had also been given.

There are a few errors, but in a directory of this kind which involves assembling a number of details, such errors are probably inevitable.

The get up of the publication is excellent.

The directory is not a priced publication.

Statement about
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I, S. Parthasarathy, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Dated 5.11.1964

Sd. S. Parthasarathy
Signature of Publisher

CURRENT DOCUMENTATION LITERATURE

CDL is an index to current periodical literature in Library Science, Documentation, Reprography and Translation. The index is mainly intended to serve the Indian librarians, students and others interested in library science and documentation. Incidentally an attempt will be made to minutely classify the articles for featuring the entries. This experiment we hope, will throw some light on the many problems of library classification and eventually lead to acceptable solutions.

The present issue of the Annals of Library Science and Documentation carries over 370 entries of papers published currently in English, non-English and Indian languages periodicals, totalling about 43. It is the intention of the publishers to give a wider coverage of periodicals from the ensuing issue onwards. It has been decided to include only original and informative articles for the purpose of this compilation.

The arrangement of entries is according to the Colon Classification, ed. 7 but the depth schedules for classification and cataloguing published earlier in the Annals have also been used. At the moment no attempt is made to give coextensive class numbers for many titles. But it is proposed to develop finally elaborate schedules for this purpose on the basis of our experience in the compilation of this list.

We earnestly hope this feature in the Annals will be received well by the subscribers. Any suggestions to improve the quality of the index will be very welcome and thankfully acknowledged.

Compiled by:

ARORA G K
GUHA B
KAMALA PADMAGIRISWARAN
RAJAN T N

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The need has been felt for a long time for a bibliographical periodical covering the entire scientific output of the country quickly and comprehensively. The Conference of Information Scientists convened by the Council of Scientific & Industrial Research in Mysore during 1963 realised this need acutely and directed the Indian National Scientific Documentation Centre (INSDOC) to take immediate action for ensuring bibliographical control of scientific publication in India.

INSDOC has decided to start a monthly abstracting service from January 1965, reporting under the title "Indian Science Abstracts" the work published by scientists in India. As far as possible efforts will be made to include scientific communications published abroad by Indian nationals. Original articles, short communications, critical reviews and informative articles published in scientific and technical periodicals or in proceedings of scientific conferences, symposia, etc., monographs and other ad hoc publications, as well as patents and standards, will be noticed in this publication. The annual subscription for the publication will be Rs. 50/- only (U. S. A. $30, and £10 for others).

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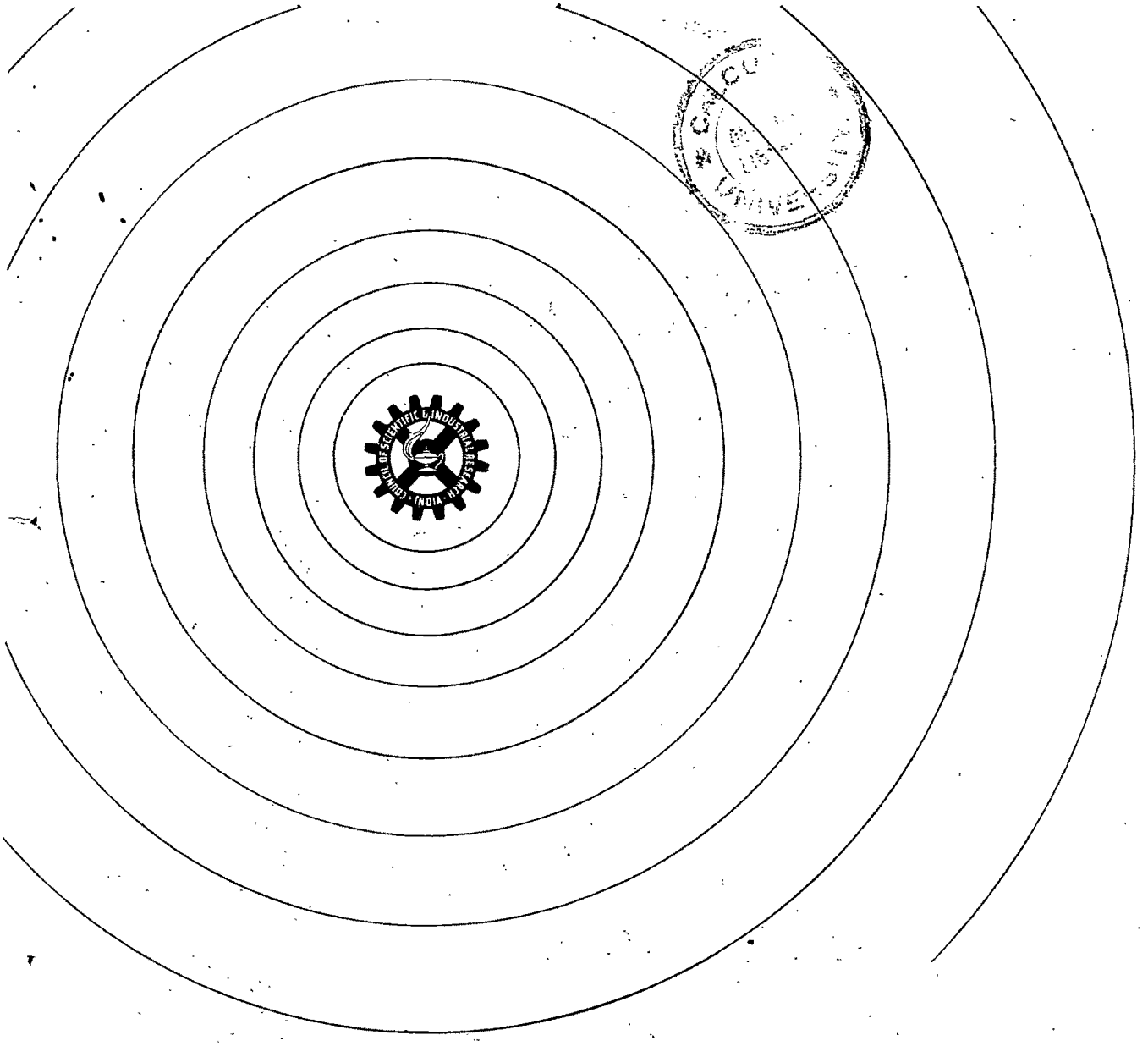

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EDITORIAL

3rd, Mr. Rene Maheu, the Director-General of Unesco, delivered the first of his memorable Azad Memorial Lectures on International Cooperation at the Azad Bhavan. To the editors of this journal, his remarkable analysis of the techniques of international cooperation was most heartening because of the memorable terms in which he spoke on the importance of documentation to any international effort in the realm of education, science and culture. This was the first plenary statement by any one of his status and potential for international initiative, which took the Time Spirit into cognizance and gave the concept of documentation in the humanities and in the sciences, its due. For us, who are the votaries of this concept, the significance of this statement has been long evident. But to lift this concept from out of a specialised field and focus the attention of educationists, administrators and the generality of the public on to it was the special emphasis of the Director-General of Unesco. Important as documentation is to the sophisticated areas of the world, its desperate need for the developing areas of the world was never so clearly stated as by Mr. Maheu in his address. Occupying a position that he does as the Director-General of the only international organisation completely dedicated to the purposes of developing MAN through the media of education, science and culture, such recognition of the importance of documentation augurs very well indeed for the world, and because of the importance of this remarkable statement we reproduce below the relevant paragraphs from his lecture so pregnant with meaning for all of us.

"The problem of documentation is, at world level, what the problem of memory is at the individual level. Documentation is the memory of mankind, and its knowledge which has been acquired by several men or several intellectuals and scientists, should be organised in such a way that it would be available to the whole of mankind, and would become the memory of MAN and not the knowledge of some men. Documentation is a field in which UNESCO has already been active and should be more and more active because it provides the solution to this problem of building up the memory of mankind and the solution of this problem depends to a considerable extent on the structure of world civilisation.

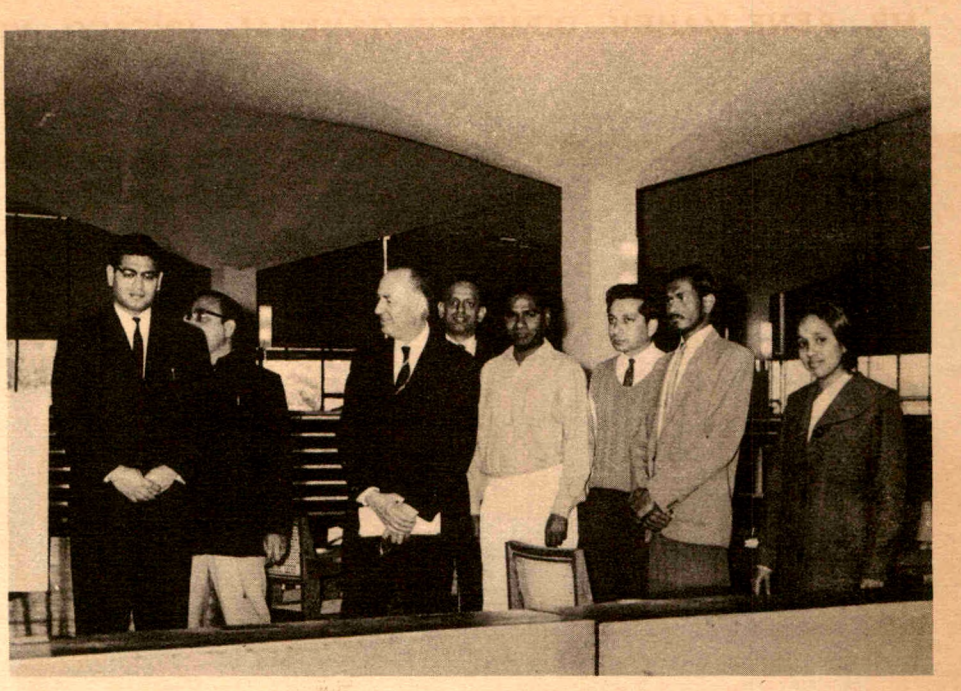
The problem of documentation is not of interest only to specialists because only specialists can grasp the complexities of the questions involved, but in its meaning the problem is a problem for everybody".

B. S. Kesavan
25th February 65

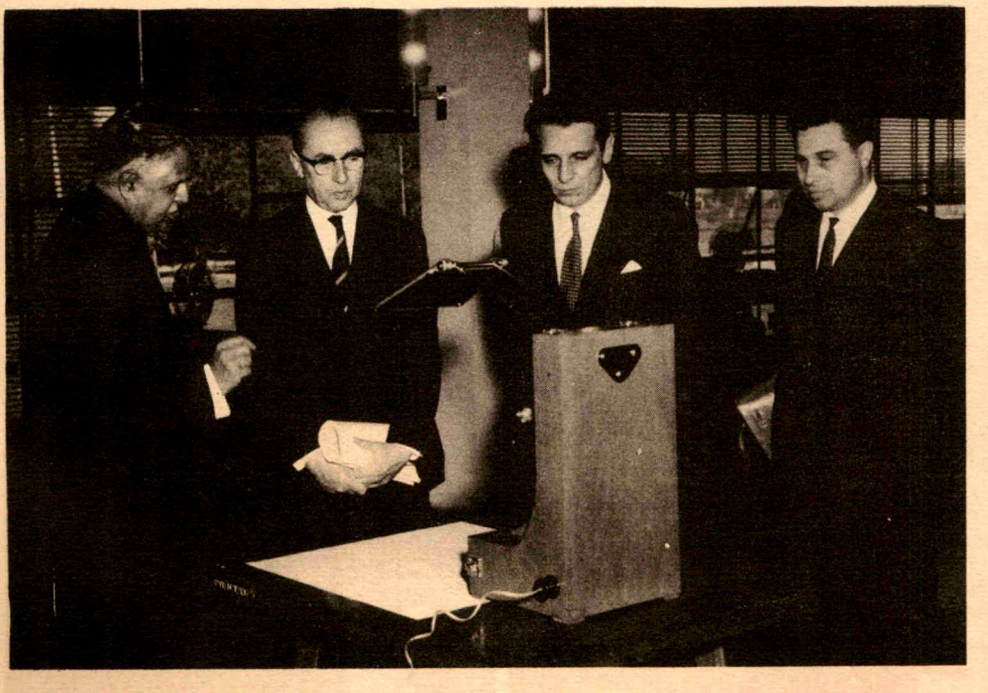
MR. RENE MAHEU: DIRECTOR GENERAL, UNESCO, VISIT TO INSDOC

Discussing the Insdoc List Appraisal Report with Shri B. S. Kesavan, Director, Insdoc.

Discussing Indian Science Abstracts with Shri S. Dutta, Editor.



With the staff and students of Documentation and Reprography Training Course.



Observing the working of the microfilm reader manufactured in India. Also seen in the picture are Shri B. S. Kesavan (extreme left), Mr. P. C. Terenzio, Director, Bureau of Member States, Unesco, and Dr. A. Evstafiev, Director, Unesco, SASCO, New Delhi.

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CLASSIFICATION OF CHEMICAL COMPOUNDS IN CC. INORGANIC COMPOUNDS 1

G K ARORA
T R VENKATASUBRAHMANIAN *
T N RAJAN
Insdoc, Delhi-12

Defines the scope of this series of articles. Applies the rules and schedules of CC [3] for the classification of basic and amphoteric oxides, hydroxides, binaries other than oxides acids and salts, and for hydroxides. Highlights the problems involved. Suggests possible lines of amplification of the existing schedules and also offers possible solutions to some of the problems encountered, particularly for working out co-extensive class numbers for hydroxides of an element.

E INTRODUCTION

A study of Chemical Abstracts reveals that at present the chemical literature is doubling every 8.3 years on an annual basis [1]. It is also observed that the Chemical Abstracts systematically scans about 10,000 periodicals carrying articles pertaining to chemistry and chemical technology. This is against the estimated total of 60,000 periodicals in natural sciences covered by the World List. Considering the rate of increase of chemical literature and also the coverage of it in the Chemical Abstracts, it can be reasonably stated that the literature in the field of chemistry pouring in every year forms about one seventh of the total literature in the field of natural sciences.

A study of the Insdoc List, which reports the current literature in all the branches of natural sciences, and which is designed to cater to Indian requirements, reveals that, out of a total number of 38,334 articles reported in 1961, as many as 10,794 were in the field of chemistry and another 2152 in the field of chemical technology [2]. From these figures it appears that about one third of the literature reported in the Insdoc List is pertaining to chemistry and chemical technology. This List gives selective coverage to world literature in natural sciences. It is classified by CC but since the classification is merely from titles, it is necessarily broad. It is noteworthy, however, that there is a considerable amount of micro-literature on chemical compounds. Macro-literature on chemical compounds has also been on the increase. This literary warrant makes it necessary to provide for depth classification of compounds.

This article is proposed to be the first of a series of articles on the classification of chemical compounds. The purpose of this series would be, in the main, to apply the rules and schedules of Colon Classification[3] for chemistry for working out isolate numbers for chemical compounds and to highlight the problems involved. This study has also been, in part, motivated by the difficulties encountered in teaching the subject.

It is intended to break this study into two distinct categories viz (1) Inorganic compounds and (2) Organic compounds. This article is devoted to the construction of isolate numbers for basic and amphoteric oxides, hydroxides, binaries other than oxides acids and salts, and for hydrides.

For easy reference the section numbers in this article correspond to the numbering used in Chapter E of Part 1 of Colon Classification Ed 6, 1963, which relates to the rules for the classification of chemistry. At some places some variation from these numbers is also resorted to depending upon the observations made.

E1 SUBSTANCE FACET

The isolate numbers for elements have been based on the Mendelevian Periodic Table with some modifications. Generally these isolate numbers are three digited, and in certain cases, four digited. The first digit which represents the substance division is always '1'. The second digit in the isolate numbers for elements represents the group to which the element belongs and the third ordinarily represents the period of the element. In this manner only the elements have been enumerated.

* CECRI, Karaikudi.

The substance focus '19' has been used in CC for accommodating special groupings of elements. Among the groupings listed are

191	Metal
1911	Noble metal
1917	Radio-active metal
192	Rare element
1921	Lanthanides (Rare earths)
1923	Actinides (Transuranic)
193	Alloy
195	Non-metal
196	Isotope
198	Gas
1981	Air

Some other groupings of elements which have got sufficient literary warrant on them and which are conspicuous by their absence from the above list are :

Alkali metals
Alkaline earth metals
Radio-active non-metals
Transition group elements
Halogens
etc.

E101 Isotopes

Ever since the isolation of isotopes of Neon by Thompson in 1912, there has been a great increase in the study of isotopes of different elements. These isotopes fall in the categories of radioactive or non-radioactive. The former category has been of special interest because of the many practical applications to which it can be put. There already exists a considerable body of literature on the radioactive isotopes of transuranic elements used in the generation of atomic energy by nuclear fission. There is also a good deal of literature on the use of radioactive isotopes of Cobalt and other elements in radio-therapy. Literature on radioactive dating of archaeological finds is also there. Quite a large amount of literature is also found on radioactive isotopes used as tracer elements. All this necessitates classification of literature on various radioactive and non-radioactive isotopes of elements.

The only device which could possibly be applied for working out the isolate numbers for specific isotopes is the Superimposition Device. This Device when used for constructing an isolate number for a radio-active isotope of a metal, e.g., $Cobalt_{60}$ would result in the formation of synomymous isolate numbers, because when considered as a radioactive metal, the isolate number for it would be the superimposition of '183' i.e. the isolate number for cobalt on '1917', i.e. the isolate number for radio-active metal, and again when considered simply as an isotope of cobalt, its isolate number would be the superimposition of '183' on '196' i.e. the isolate number for isotope. This synonimous feature is in addition to the problem of choosing the order in which the two superimposing isolate numbers are to occur in the superimposed isolate number.

Working out of the isolate numbers for radio-active isotopes of a metal presents another difficulty. The number of radioactive and non-radioactive isotopes of an element may be more than one, in which case some further sharpening of the focus in the isolate number would be necessary for working out co-extensive class numbers. In fact, this problem has to be faced in the case of all elements which have isotopes.

It may also be observed here that the isolate number '1917' takes care only of radioactive metals. The present schedules of CC do not provide any place for radio-active. non-metals e.g. $Carbon_{14}$ used for the dating of archaeological finds.

The application of the Superimposition Device to transuranic elements e.g. Plutonium, also results in the formation of synonymous isolate numbers because when considered as a radio-active metal, the isolate number for it would be the superimposition of '1693' i.e. the isolate number for Plutonium on '1917', i.e. the isolate number for radio-active metal, and when considered as a transuranic element, its isolate number would be the superimposition of '1693' on '1923' i.e. the isolate number for transuranic elements. In addition to this the isotopes of transuranic elements could be considered simply as isotopes in which case the superimposed isolate number will be the result of superimposing the isolate number for the particular transuranic element on '196' i.e. the isotope.

E102 Allotropes

In recent years there has been a substantial amount of literature on allotropes, e.g. Graphite, Ozone etc, for which there is presently no provision for classification in CC.

E11 COMPOUNDS

While there are isolate numbers for, (a) all the elements considered together, (b)

individual elements, and (c) special groupings of elements, there is no provision for all the compounds taken together. Again, though there is an isolate number provided for all organic compounds considered together i.e. '5', there is no similar provision for all inorganic compounds taken together.

A possible isolate number for all inorganic compounds taken together may be established by the use of Z which is both an empty and emptying digit [4]. The isolate number '1Z' may be defined as a partially comprehensive isolate number denoting the inorganic compounds falling under '2', '29' '3' and '4'. It would thus cover oxides, hydroxides, binaries, acids and salts - in fact all inorganic compounds taken together.

In addition to providing isolate numbers for chemical compounds (organic and inorganic) taken as a whole and also for inorganic compounds taken together, there is also a case for providing isolate numbers for all the compounds (inorganic and organic) of an element or a group of elements considered together.

E120 BASIC OXIDES AND HYDROXIDES

In CC the oxides have been treated under four categories viz (1) Basic oxides, (2) Amphoteric oxides, (3) Acidic oxides, and (4) Neutral oxides. The hydroxides are, however, considered together along with the rule for basic oxides which runs as follows:

"If a book deals primarily with a hydroxyl or a basic oxide of an Element, its Substance Number should consist of digit '2' followed successively by the number of the constituent element i.e. the element whose hydroxyl or basic oxide forms the primary subject-matter of the book, and the Valency Number i.e. the Arabic numeral representing the valency of the element in the oxide".

In this rule the term "hydroxyl" has been used. "Hydroxyl" stands only for the radical (OH) and as such this term requires to be replaced by the term "hydroxide". In accordance with this observation, the term "hydroxyl" appearing in similar context in the subsequent rules of CC has also been taken to stand for "hydroxide". This change of terms has been made even in quoting the other rules of CC wherever necessary.

In the application of the above rule, there are quite a few problems encountered in working out the substance numbers for basic oxides and hydroxides. These problems are given as annotations to Table 1 which shows the result of the application of this rule to the basic oxides and hydroxides of Iron. The element 'Iron' has been particularly chosen for illustration because of the following reasons :

(1) There is plenty of literature on the oxides and hydroxides of Iron, particularly in the corrosion studies, and in the scale formation at elevated temperatures. Therefore, there is a real demand for depth classification of the basic oxides and hydroxides of this element.

(2) The classification of the various basic oxides and hydroxides of Iron highlights the problems involved in working out co-extensive class numbers for similar compounds of other metals.

In the Table 1 (p 50), the Roman numerals put within circular brackets in Col 3 indicate the valency that iron exhibits in the particular oxide or hydroxide.

Annotations :

(1) The application of Rule E120 of CC results in a homonymous class number 'E282' for Iron oxides and Iron hydroxides in general. This observation can be extended to the basic oxides and hydroxides in general, of all the elements.

(2) There is no provision for sharpening the compound focus for specific hydroxides of other elements.

(3) In Iron (II & III) oxide, also known as ferroso-ferric oxide or ferrosic oxide, Iron exists in both the valency states of 2 and 3. This creates a problem in the sharpening of the compound focus of Iron (II & III) oxide on the basis of the valency. Similar problem arises, for example, in the case of Manganosic oxide (Mn_3O_4) and Red Lead (Pb_3O_4) where the respective elements forming the oxides, exist in the valency states of 2 and 4. This is also a problem requiring solution.

(4) Hydrated iron (III) oxide also known as Hydrated-ferric oxide wherein iron exists in the trivalent state only, also poses a problem, because the sharpening of the compound focus on the basis of valency would make it synonymous with anhydrous ferric oxide.

TABLE 1

Basic Oxides and Hydroxides of Iron

Sr No.	Basic oxide/Hydroxide			Valency of Iron in the Basic oxide/Hydroxide	Class Number		
	Old Terminology	New Terminology	Formula		According to the Rule E120 of CC	According to modifications suggested in Sec E12090	According to UDC[5]
1	2	3	4	5	6	7	8
1	Iron oxides	Iron oxides	Fe_xO_y	?	E282	E282	546.722-31
2	Ferrous oxide	Iron (II) oxide	FeO	2	E2822	E2822	546.722-31
3	Ferric oxide	Iron(III) oxide	Fe_2O_3	3	E2823	E2823	546.723-31
4	Ferroso-ferric oxide or Ferrosic oxide	Iron(II & III) oxide	Fe_3O_4	2 & 3	E282?	E282?	546.723.722
5	Hydrated ferric oxide	Hydrated iron (III) oxide	$Fe_2O_3.H_2O$ or $FeO(OH)$	3	E282?	E282?	546.723-31-32
6	Iron hydroxides	Iron hydroxides	$Fe_x(OH)_y$	?	E282	E2829	546.722-36
7	Ferrous hydroxide	Iron(II) hydroxide	$Fe(OH)_2$	2	E282?	E28292	546.722-36
8	Ferric hydroxide	Iron(III) hydroxide	$Fe(OH)_3$	3	E282?	E28293	546.723-36

E1201 AMPHOTERIC OXIDES

The CC rule relating to the classification of amphoteric oxides reads :

"An amphoteric oxide should be treated as a basic oxide in constructing its Substance Number".

"It may be stated here that since for the purposes of classification there is no differenciation between basic and amphoteric oxides, there appears to be no need for this separate rule. This rule could, therefore, be incorporated in the earlier rule E120 with advantage.

E1203 Two or more Basic or Amphoteric oxides with the same valency for the constituent element

With the incorporation of the suggestions made in the above section, Rule E1203 of CC Pt 1, Ch E reads :

"If there be more than one basic [or amphoteric] oxide with a given valency for the element, the number got by Rule E120 should be used for one of them and the numbers 1, 2, etc, are to be added to the number got by Rule E120 in the case of second, third, etc., respectively of the basic [or amphoteric] oxides".

In this rule the incorporation of the suggestions made in the previous section is indicated by the use of square brackets.

The application of this rule will arise only in the case of elements forming sub-oxides, peroxides, ozonides and super-oxides. Table 2 shows the result of application of the rule to these four kinds of oxides.

TABLE 2
Some Oxides of Lead and Sodium

Sr. No.	Oxides		Class Number	
	Terminology	Formula	According to the Rule E1203 of CC	According to UDC[5]
1	Lead sub-oxide	Pb_2O	E24821	546.816
2	Lead monoxide	PbO	E2482	546.817-31
3	Sodium peroxide	Na_2O_2	E21112	546.33-39
4	Sodium oxide	Na_2O	E2111	546.33-31
5	Sodium ozonide	NaO_3	E21113	?
6	Sodium superoxide	NaO_2	E21114	?

In Table 2 there is no column corresponding to Col 3 of Table 1. This is because the valency of Lead in both the oxides of it mentioned in the Table 2 is '2' and that of sodium in the four oxides of it is '1'.

Annotations:

1. The rule does not fix any sequence for sharpening the compound focus of the oxides having the same valency for the constituent element. However, in the interest of uniformity in classification, it would decidedly be helpful if the sharpening of the compound focus is in accordance with the order followed in Table 2, i.e., no sharpening of the compound focus for the normal oxide, sharpening it by the addition of digit '1' for the sub-oxides, '2' for the peroxide, '3' for the ozonides and '4' for the superoxide in general. The sharpening of the compound focus for specific super-oxides may be done by the addition of digits 5, 6, etc.

This practice of sharpening the compound focus of basic or amphoteric oxides having the same valency for the constituent element is also to some extent in accordance with the Canon of Mnemonics.

2. It may also be stated at this point, that literary warrant demands providing isolate numbers for sub-oxides, peroxides, ozonides and superoxides, treated in general, without reference to any specific element.

E12090 TWO OR MORE HYDROXIDES OF AN ELEMENT

As observed in the annotations 1 and 2 to Table 1 in Sec E120, there is necessity of providing co-extensive class numbers for various hydroxides of an element and also for resolving the homonym in the class numbers for oxides (basic and amphoteric) and hydroxides of the same element considered as a whole.

As in the case of basic and amphoteric oxides where the sharpening of the focus in the substance number is on the basis of valency of the constituent element represented by digits '1', '2', etc., a solution to these problems also, may be found in the sharpening of the focus in the substance number for hydroxides on the basis of the valency of the constituent element itself, by taking the valency number to the next sector of zone 2, i.e. 91, 92 ... 98. Thus the compound focus for specific hydroxides of an element with valencies 1, 2,.. etc. would be sharpened by the addition of digits 91, 92, ... etc to the class number obtained on the basis of rule E120 of CC. Again, the compound focus for all hydroxides of an element taken together may be sharpened by the addition of the digit '9' only, to the class number obtained on the basis of Rule E120.

The suggestions made in the above paragraph have been applied to the classification of hydroxides of iron and the result of this is indicated in Col 7 of Table 1. It may be noted that in this way the homonym in the class numbers in Col 6 for iron oxides and iron hydroxides (Sr Nos. 1 and 6) has been resolved. In addition, ferrous hydroxide and ferric hydroxide (Sr Nos 7 and 8) have been provided with co-extensive class numbers.

Thus it can be seen that out of the four problems raised in sec 120 as annotations only the problems relating to annotation 3 and 4 remain to be solved.

E129 BINARIES OTHER THAN WATER, WHICH ARE NEITHER HYDROXIDES, NOR ACIDS NOR SALTS

With the incorporation of the suggestions made relating to terminology in regard to Rule E120 of CC, in sec E120, the rule E129 of CC reads :

"The Substance Number 29 is used, as is indicated in Chapter E of the Schedules, for binaries other than water which are neither hydroxides nor acids nor salts. Water is regarded as the hydroxide of hydrogen in the construction of its Substance Number".

The following observations may be made in connection with this rule.

1. The first part of the rule refers to the exclusion of hydroxides from binaries. Since hydroxides are ternaries and not binaries, the question of their exclusion from binaries does not arise.

2. Water can be treated in the following three ways :

(a) As a binary
(b) As an oxide of hydrogen
(c) As a hydroxide of hydrogen

(a) Water as Binary :

If treated as a binary the isolate number for water will be got by the sharpening of focus in the substance number '29'. However, literary warrant demands a favoured treatment for the isolate number for water as compared to other chemical compounds. Therefore, it is better not to treat it as a binary.

(b) Water as an Oxide :

If treated as an oxide, it could again be treated in the following four ways :

(i) As a basic oxide
(ii) As an amphoteric oxide
(iii) As an acidic oxide
(iv) As a neutral oxide

By treating it under categories (iii) and (iv) the isolate number for water will be got by the sharpening of focus in the substance number '3'. This is again undesirable on the basis of the favoured treatment warranted by it.

If treated under categories (i) and (ii) the isolate number for water will be '2101' since the valency of hydrogen in water is '1'.

(c) Water as a Hydroxide :

If treated as a hydroxide of hydrogen, the isolate number for water according to the suggestions made in sec E12090 will be '21091'.

Thus if the choice were to be between the treatment of water as a basic or ampho-

teric oxide of hydrogen or as a hydroxide of hydrogen, then both the Principle of Favoured Category and the Law of Parsimony would indicate its treatment as a basic or amphoteric oxide of hydrogen. However, in the idea plane, this treatment of water is not much justified because water is as much of an acidic or neutral oxide as it is a basic or amphoteric oxide.

Thus a solution lies only in its being considered as a hydroxide of hydrogen. But under the suggested rules for classification of hydroxides of an element, the isolate number for it would violate both the Principle of Favoured Category and the Law of Parsimony.

This problem could be solved by adding a supplementary rule to the treatment suggested for hydroxides in sec E12090, viz :

" In the case of water the substance number 2 should not be followed by the Full Element Number for hydrogen, but only by its Element Number".

In other words this would amount to dropping the valency number '91' for hydrogen in the hydroxide of hydrogen and the resulting isolate number for water would be '210'.

3 In the actual application of CC rule E129, a difficulty arises, that in contradiction to the rule which provides the substance number '29' for binaries, the substance number used in chapter E of part 2 of CC is '27'. It is presumed that the latter is only a misprint. This presumption is further based on the observation that the use of '27' as the substance number for binaries would result in a homonymous isolate number '2722' for Manganese (II) oxide, and the Binaries of Calcium taken together. Such instances, infact, are many.

If the presumption made above is correct, no difficulty is encountered in classifying binaries.

E12910 HYDRIDES

CC does not provide any rule for the classification of hydrides, but Ch E of Part 2 provides a substance number '2710' for their classification. Here also, it is presumed that it is only a misprint and that the substance number for hydrides is '2910'.

It is observed that hydrides which are binaries were not excluded from rule E129 of CC and yet they have been given a separate treatment. Whereas, if treated under the rule E129, there would have been a scattering of the hydrides under each element, the CC provides for their being brought together under '2910'. Infact, the resulting class numbers for hydrides are nothing but the result of application of the CC rule E129 wherein the substance number '29' is followed first by the Element Number (and not by the Full Element Number) for Hydrogen and then by the Full Element Number for the first constituent element.

The above observation indicates that the groups of chlorides, bromides, iodides and other "ides" also could be treated in a fashion similar to hydrides.

However, a word of caution would be necessary here, because "ides" could be considered both as binaries and also as "ides". This would result in synonymous class numbers for specific "ides". For example, Calcium (II) Nitride (III) will have the class number E29222503 if treated as a binary and the class number E2950222 if treated as an "ide".

There are two ways of meeting this problem. Either it may be left to the care of the Principle of Local Variation whereby each library may decide for itself in choosing the method of organizing the literature on the area, or, a specific rule should be provided restricting the use of '2910', '2971' etc for hydrides and chlorides etc. in general, and the treatment of specific "ides" in accordance with the general rule E129 for binaries other than acids and salts.

In fact leaving "ides" to the care of the Principle of Local Variation would result in providing alternative locations similar to those provided in Bibliographic Classification by Bliss. This is against the spirit of CC.

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AUTOMATION IN DOCUMENTATION

1. UNION CATALOGUE PROCESSING BY DIGITAL COMPUTER

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Describes the compilation and the production problems associated with Union Catalogue. Builds up the background for the computer. Enumerates the probable uses to which the computer can be advantageously put in Insdoc.

I GENESIS

The essence of documentation lies in the accurate and speedy dissemination of information about knowledge to society. Considerable thought has been devoted to make documentation realise this goal. Viewed from this point, the theories and practices of classification and cataloguing, bibliographies, indexing and abstracting reduce to mere instruments for realising this aim. An entirely new field is being cultivated in the Western countries to attain this very purpose. This field is called "Mechanical Methods or Automation in Documentation". Sizeable amount of literature exists on this new thought. Nearly every documentation centre in the West is contributing its share in developing this field. Insdoc, too, has entered this field with a view to keep abreast with the developments and to contribute its own share in the cultivation of this field.

1.1 The Experimental Cell

There exists a cell in Insdoc which is charged with the responsibility of experimenting with the various mechanical methods available for documentation and to develop few methods which could efficiently be used under Indian conditions. This cell recently conducted an experiment on digital computer in non-arithmetical data processing.

2 INTRODUCTION

In this paper an attempt is made to describe the experiment as fully as possible without using too much jargon either of the computer field or of the field of documentation. An attempt is also made not to sacrifice precision for the sake of simplicity and as such wherever a jargon had to be used it has been defined as lucidly as possible before its use. Very little knowledge in either fields is assumed on the part of the reader.

The experiment if being referred to as "Union Catalogue Processing by the Computer". This experiment has been conducted at the Computer Centre of Indian Institute of Technology, Kanpur, during the third week of October 1964.

2.1 Scope

Nothing new is claimed in this experiment except that it is the first of its kind in India. The programmes used are claimed to be neither original nor the most efficient. However the experiment is unique in the sense that as far as possible the thoughts and the details of the original records have not been allowed to be much influenced or conditioned by the computer.

2.2 Object

The experiment was conducted with a view to ascertain the following

1 Elements of speeds and accuracy with which the non-arithmetical data can be processed on a digital computer;

2 Practical problems that are met with in processing the non arithmetical data;

3 The possibility of using a digital computer efficiently in the other routines of Insdoc; and

4 The extent to which the computer can be used in the processing of the Union Catalogue of Scientific periodicals available in India.

3 THE UNION CATALOGUE

The union catalogue is a complex and very important concept in the field of documentation. Basically it is the list of periodicals indicating their availability in a limited geographical region. Insdoc became interested in the compilation of the Union Catalogue of scientific and technical periodicals available in India. The work on this project was started in 1959. About 375 technical and scientific libraries reported their holdings. These holdings reported about 12,000 different titles of periodicals.

3.1 Physical Form

The union catalogue exists on card form in Insdoc. The physical appearance of the union catalogue at the moment is only a catalogue cabinet holding 5 x 3 cards. A single card or a set of cards represents an entry in this catalogue. Such a form imposes a heavy restriction in the use. An extensive use of the catalogue can only be made if this catalogue is printed. The use of conventionally available methods in the processing and the preparation of the press copy will take so much of time that the printed catalogue will have very little uptodate information. The increased man-power in order to cut this essential time is most likely to result in questionable accuracy and reliability.

3.2 Structure of the Entry

An union catalogue entry consists of a number of items of information. Each item of information is technically called a section. Thus an entry consists of number of sections. A detailed account of the structure of an entry can be obtained in any standard book or catalogue code. (Entries in this union catalogue have been constructed according to the Classified catalogue code ed 4., which gives a very rigorous treatment). In other words, a standard union catalogue entry comprises of the following important sections:

1 Call Number section;
2 Heading or title section;
3 History section; and
4 Holding section.

CALL NUMBER SECTION is the first section of the entry. It contains the class number of the periodical and a serial number by which the periodical can be identified. The class numbers have been assigned according to CC(= Colon Classification ed 5).

HEADING SECTION is the second section of the entry. It contains the name of the periodical as found on the title page of the periodicals.

HISTORY SECTION is the third section of the entry. It contains the date of the first volume of the periodicals and other historical details which might be of interest.

HOLDING SECTION is the last section of entry. It contains the list of the libraries along with their holdings of the periodical.

3.3 Illustration

A sample union catalogue entry is given below:

Fm55, N28 3653
CHEMISCHE fabrik. (=Zeitschrift des vereins Deutscher Chemiker Teil B).
1;1928C
From 15;1942 continued as CHEMISCHE technik.
From 19; 1947 continued as ANGEW ANDTE chemie. Ausgabe & Technischwirtschaftlicher teil.
From 21; 1949 continued as CHEMIE-Ingenieur-Technik.

P1A3	24C	Q1BF	7C
P1KF	31C	Q1PE	21C(21-22)
P1MF	23C	Q2BhF	1C(33)
P1MF4	31C	R1DF	24C
P3BA	1C(13-28)	R5DJ	8C(12, 13-20)
P3MF	24C	R6L3	21C
P5HA	28C	S2CA2	21-22
P5W3	?	S2KF	1955C

In this entry the first line is the call number section. Fm55, N28 is the class number of the periodical according to CC and 3653 is the serial number of the entry in the Union Catalogue. The next two lines starting with "Chemische" and ending with the"Teil B)" is the title of the periodical. The historical section is 1:1928C which means that the first volume of the periodical was published in 1928 and the periodical has not ceased publication. The next three sections relate to the change of name of this periodical. The last section is holding section. This section gives that only 16 libraries in India are having this periodical. The first part P1A3 is the code number for the

library, and the second part i. e. 24C is its holding. 24C indicates that the library is having this periodical from volume number 24 and is still subscribing to the current issues. Similarly the second library has the periodical from volume 31 and is still subscribing to it. It will be clear that the size of the entry will depend on the nature of the periodical and the amount of information that has to be incorporated into it.

3.4 Basic Data

The basic data for the experiment comparised of about 100 such union catalogue entries. These entries were selected at random from the card file of the Union Catalogue at Insdoc.

4 CONVERSION

The unit of basic data is the union catalogue entry described in sec 3. This entry contains information coded in natural language in a form which can be easily read by human beings knowing English. This basic data as such is not intelligible to non English speaking persons. In order to give him the information, the entry has to be converted into a language known and understood by him. Similarly, these entries of basic data had to be converted into a language which a machine can understand or can be made to understand. Such a language exists and is technically called machine language. In this language everything rather every bit of information has to be converted into the presence and/or absence of a physical state.

4.1 Machine Readable Language

A simple language understood and read by a wide variety of machines is built on the presence and the absence of a hole cut either on a card or on a paper tape. The combination of holes in different positions of a column gives the code for conversion of a natural language data into a machine readable data.

4.2 Source Data

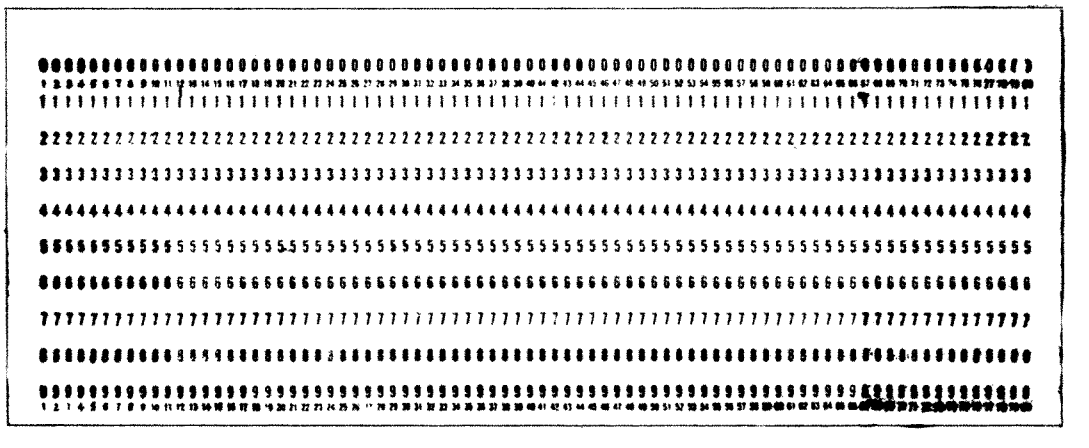
The basic data converted into machine readable form by the suitable code and on a suitable medium is called the 'Source Data'. Thus the source data for the experiment consisted of about 2,500 80 columns IBM punched cards. This source data is readable by machine, and can be fed as such to the computer.

4.3 Source Data Preparation

The source data was prepared from the basic data of 100 union catalogue entries by punching the information in each entry on to 80 column IBM general purpose punched card.

4.31 Punched Card

IBM 80 column punched card is a body-punched card. It is clear from the diagram, given below, that there are 80 columns and ten rows. For special uses, the number of rows can be increased to twelve.



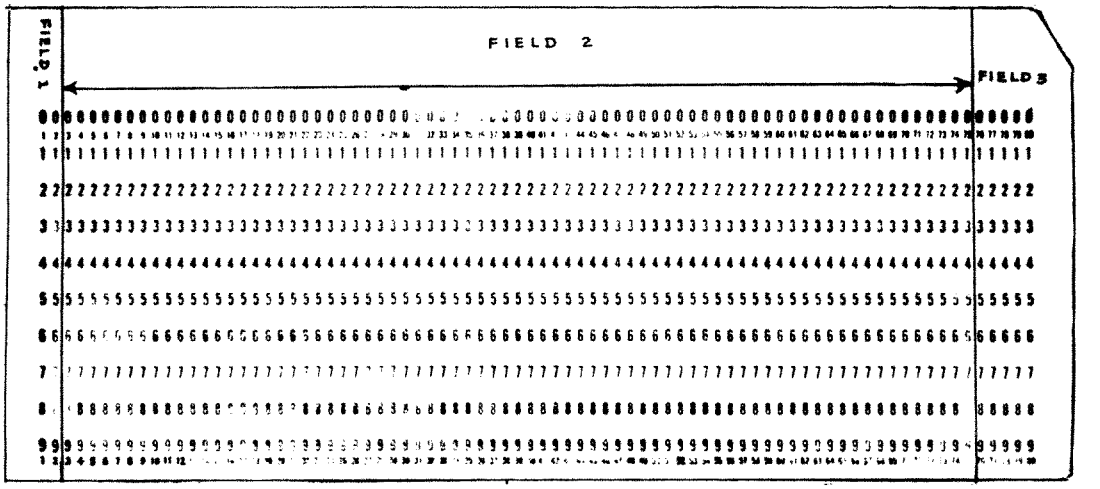
4.32 Punching

It is clear that all the information given in an entry or unit of basic Data cannot be accomodated in one single 80 column card without further coding. This is mainly because one character in an unit of Basic Data is represented by one column on punched card. Space in between words is considered as a character.

4.51 Field

The 80 column punched card was divided into the following fields as indicated in the figure 2

1 Continuation Card Field;
2 Information Field; and
3 Serial Field



Field 1 or Continuation Card Field contains the continuation number of the card in column 1 and 2. There were two series of continuation numbers viz - 1) pure Indo-Arabic numerals and 2) mixed numbers of Roman capitals and Indo-Arabic numerals. The first type was used for numbering all the continuation cards upto History section of the entry in the basic data. The second type was used for numbering the continuation cards of the holding section of the entry in basic data. Every library was punched on a fresh card. The numbering was done in the following way

A1, A2, ..., A8, A9, ..., B1, ..., Z9

Field 2 or Information Field contains the items of information from an entry in basic data between 4 columns 3 to 75 both inclusive.

Field 3 or Serial Field contains the serial number of an entry in the Union Catalogue in column numbers 76-80.

4.52 Instruction

The following punching instructions were given for the preparation of the source data:

1 Punch the continuation card number on each card in columns 1 and 2 in a fixed field punching mode starting from 01 for the first card;

2 Punch a fresh card for each section of an entry in basic data from column number 3 to column number 75. The first card of each section is to be punched from column number 5 and not from column number 3;

3 All the continuation cards of the same section are to be punched from column number 3;

4 Put a $ mark to indicate a section;

5 Follow composition rules while punching the cards;

6 Punch the serial number of an entry in columns 76-80 in a fixed field punching mode on each and every card punched for the entry.

7 Punch library holdings, given in the holding section of an entry in basic data, on separate cards for every library. Punch the library symbol between col 3 to 12. Punch the holding from column 17. Punch the serial number in col 76-80. Punch the continuation card numbers A1 in Col 1 & 2 for the first library A2 for second library and so on.

8 Verify all the cards thus punched, by the entry in the basic data.

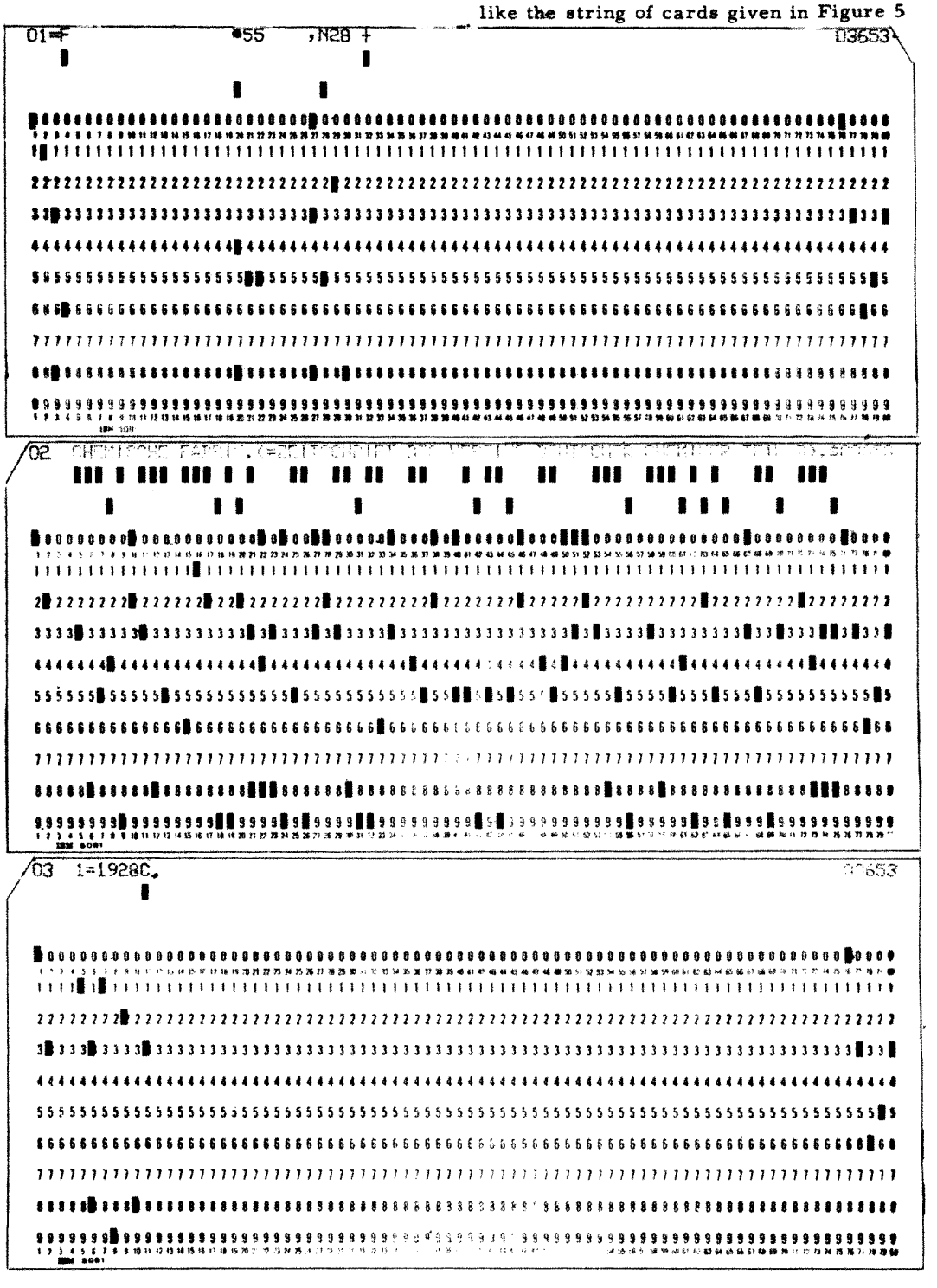
4.6 The Source Data

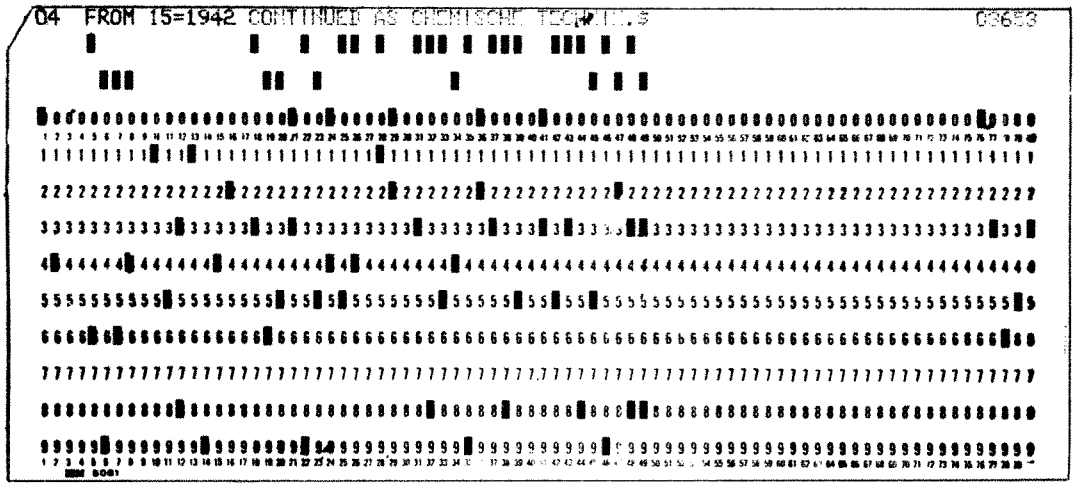
With these instructions, the basic data of 100 entries from Union Catalogue was

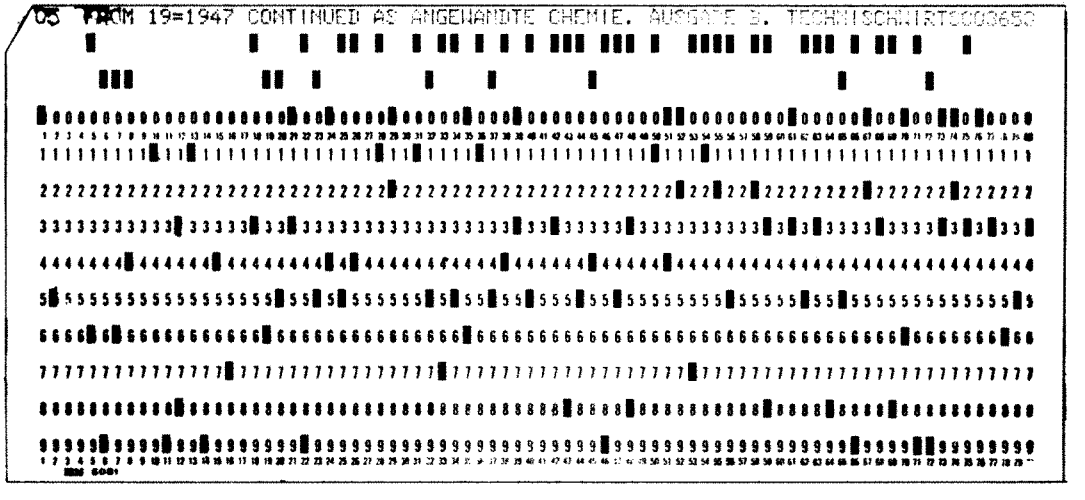
converted into source data on punched cards. The basic data was replcaed in the Union Catalogue cabinets. For further experimentation the source data alone was used. It consisted of about 2,500 punched cards corresponding to 100 basic data entries.

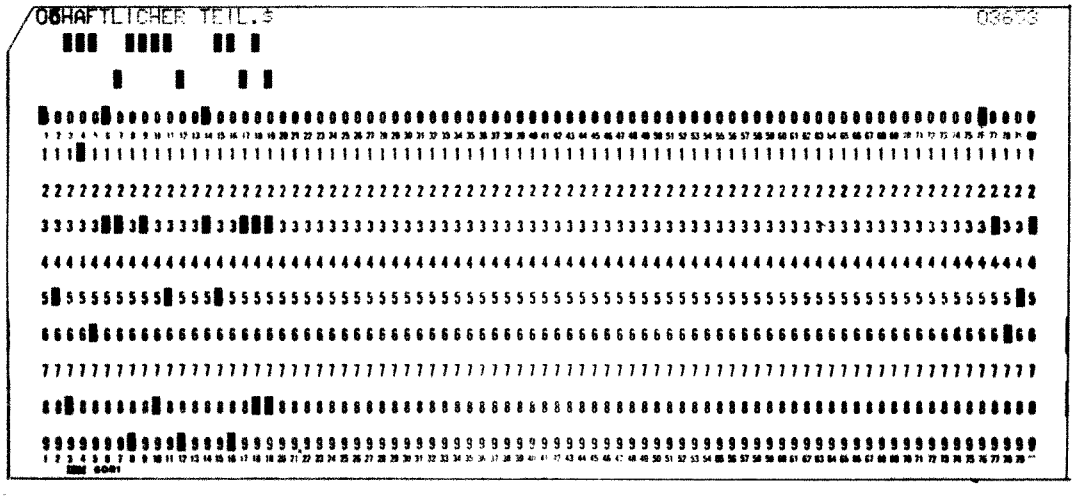
4.61 Entry

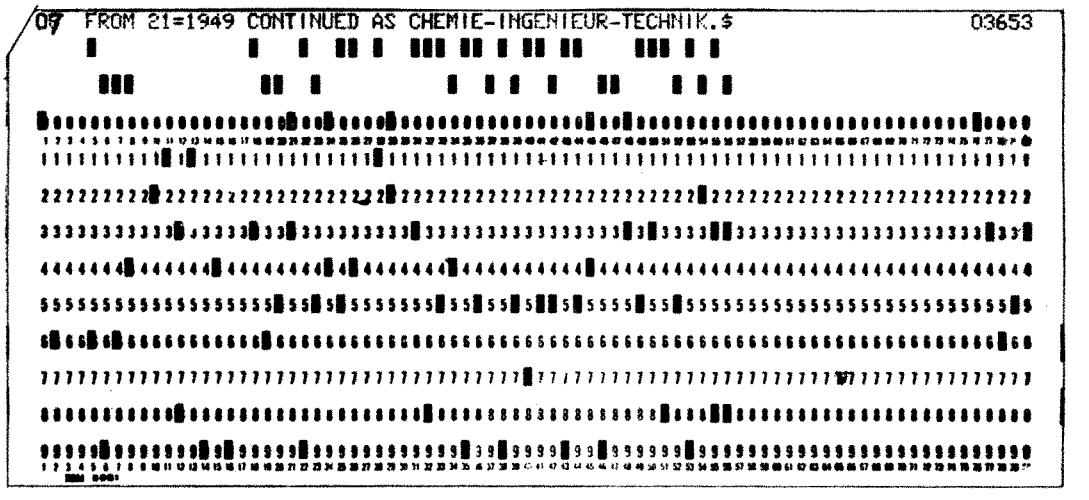
An entry in the source data consisted of a string of punched cards; connected together by the serial numbers and separated by the continuation card number. Thus the basic data entry given in sec 3.3 appeared like the string of cards given in Figure 5

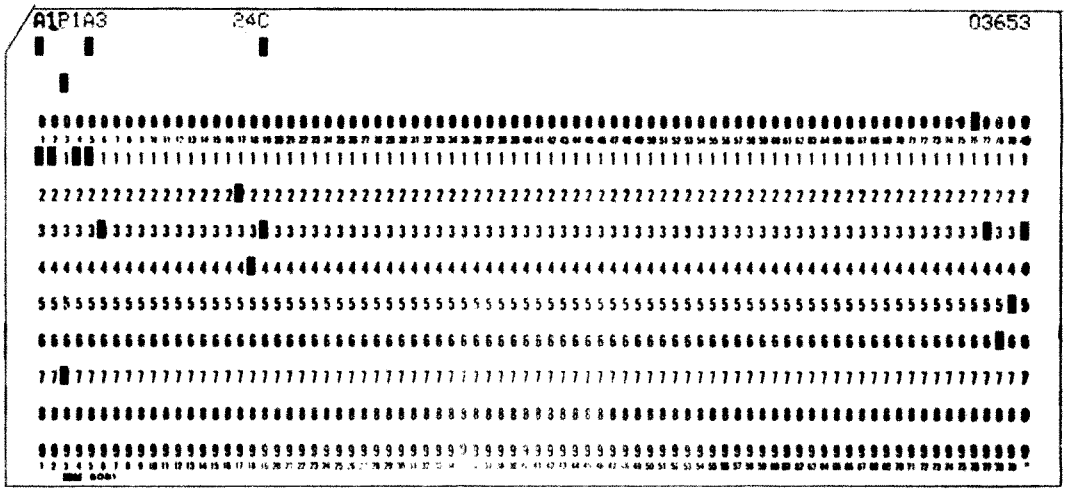


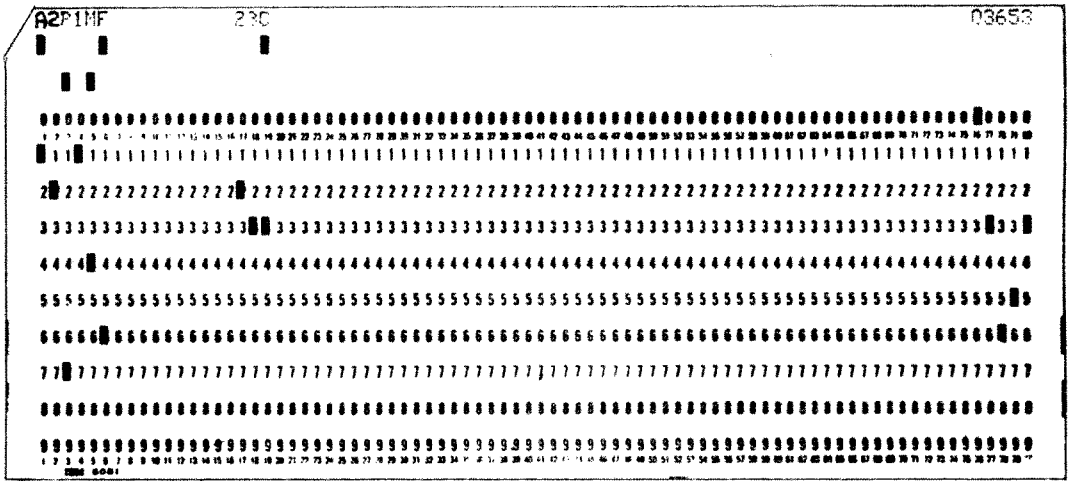

04 FROM 15=1942 CONTINUED AS CHEMISCHE TECHNIK.$
03653

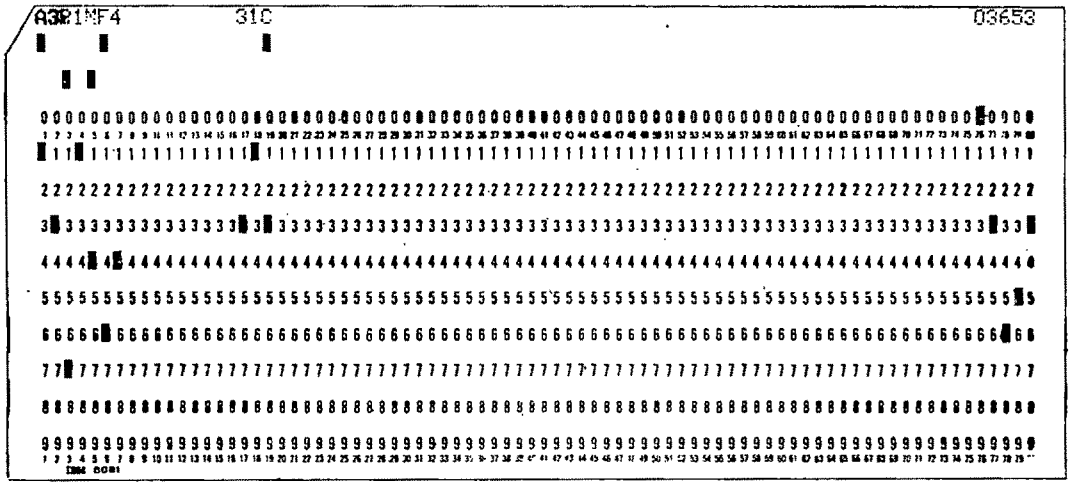

05 FROM 19=1947 CONTINUED AS ANGEWANDTE CHEMIE. AUSGABE B. TECHNISCHWIRTSC03653

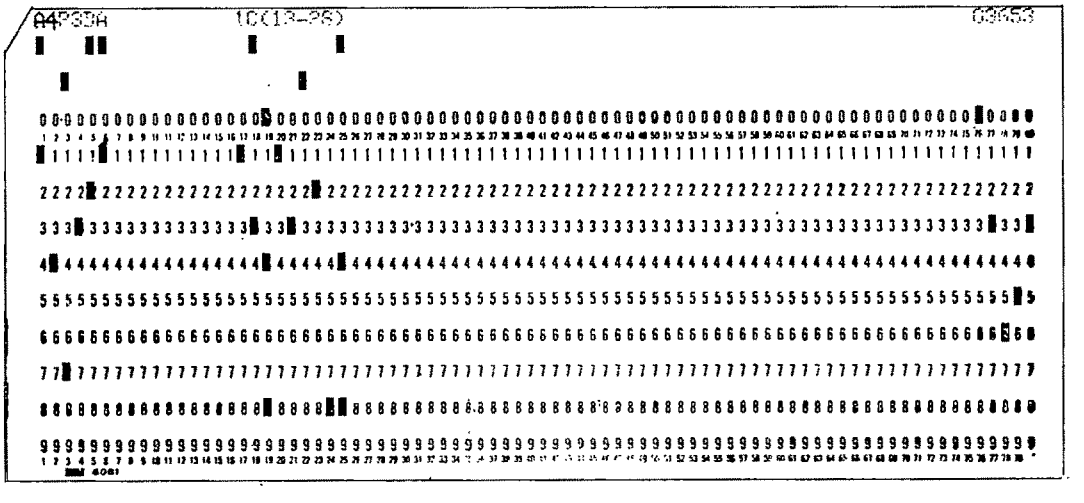

06HAFTLICHER TEIL.$
03653

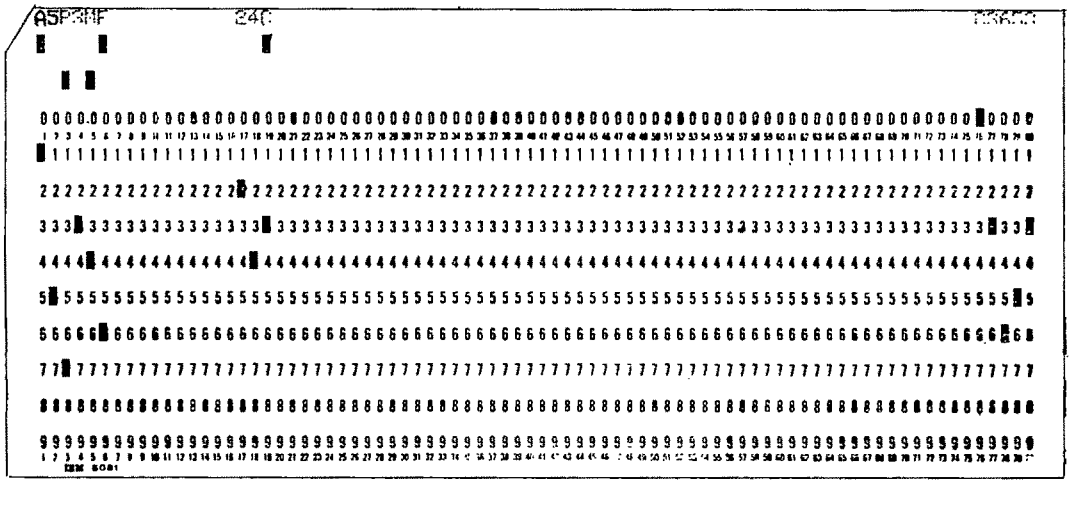

07 FROM 21=1949 CONTINUED AS CHEMIE-INGENIEUR-TECHNIK.$
03653


A1P1A3
24C
03653


A2P1MF
23C
03653







This figure is self explanatory as whatever is punched is printed on the top of the card. Thus Card 1 is call number card, Card 2 is title card and so on.

5 THE COMPUTER

A computer, in very simple terms, is a device or machine which works with and on numbers. A computer, as the name suggests, counts and manipulates numbers. Transistors have revolutionised the entire computer technology. Consequently very compact and fairly cheap and commercially economic computers are available now. There are, functionally speaking, two types of computers viz Analogue and Digital computer. Analogue computer simulates a physical phenomenon. Slide rule, clocks, and a thermometer can in a restricted sense be called examples of analogue computer.

5.1 Digital Computer

Next logical question is 'what is a digital computer?' A modern digital computer is an electronic machine. A very simple example, in a highly restricted sense, of a digital computer is an Abascus. Electronic digital computers are complex machines of intricate circuitry transistors and valves. These are built primarily for counting, manipulating and producing either numerical or alphanumerical data. Very simple operations alone can be done by this circuitry.

5.2 Structure of a Digital Computer

Schematically, a digital computer may be represented as in figure 6.

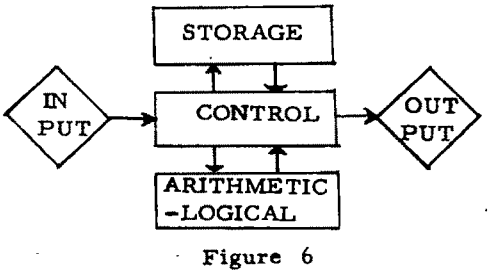


Figure 6

INPUT UNIT of a digital computer accepts Indo-Arabic numberals (numbers), Roman alphabets (letters), and Symbols (punctuation or other marks). These can be entered in the computer through this unit usually through punched cards, punched paper tape or through the key board of a typewriter provided on the computer controls.

CONTROL UNIT is the important unit which controls and regulates the entire operations of the computer. The control unit can be operated by suitable programmes

STORAGE UNIT stores the data entered in the computer through input unit by electromechanical, magnetic, or electronic devices until required. The information stored by a computer can be original input data, intermediate results, or instructions. The store can be imagined to be a number of cells arranged linearly, each cell being called a storage location. The storage location can be identified by a separate location number. The location number is called an Address.

A memory can be imagined in terms of a room full of card cabinets. Each file drawer can be rapidly located as it has its own number and all the drawers have equal capacity. Every memory or storage cell is analogous to one of the file drawers.

ARITHMETIC - LOGICAL UNIT is the part of the computer which can add, substract multiply, divide and compare numbers at very great speeds. It can take certain logical decisions. It can discern positive, zero, and negative values and transfer the information to other units of the computer.

OUTPUT UNIT can produce the results in many forms, e.g. punch a tape, punch a card, make a magnetic tape, or print in a report form.

5.3 Characteristics of a Digital Computer

A digital computer, speaking very elementarily, accepts numbers, and/or letters; works with and manipulates numbers; and gives numbers as the results. Computer operations are done with a very high speed and with equally high degree of precision. The results are usually very reliable. The computer communicates with the external world by means of electrical signals. It is capable of taking simple logical decisions. It can use a large storage area on a very compact data storage media. It has high speed of selection and retrieval of the stored information. The computer is able to adapt to a wide variety of conditions effecting the source data, accumulation of data, transmission of data and processing of data. Such versatility, speed, and accuracy make a digital computer a powerful tool with great potentiality in the field of documentation. Figure 7 gives the flow of information inside and outside the computer.

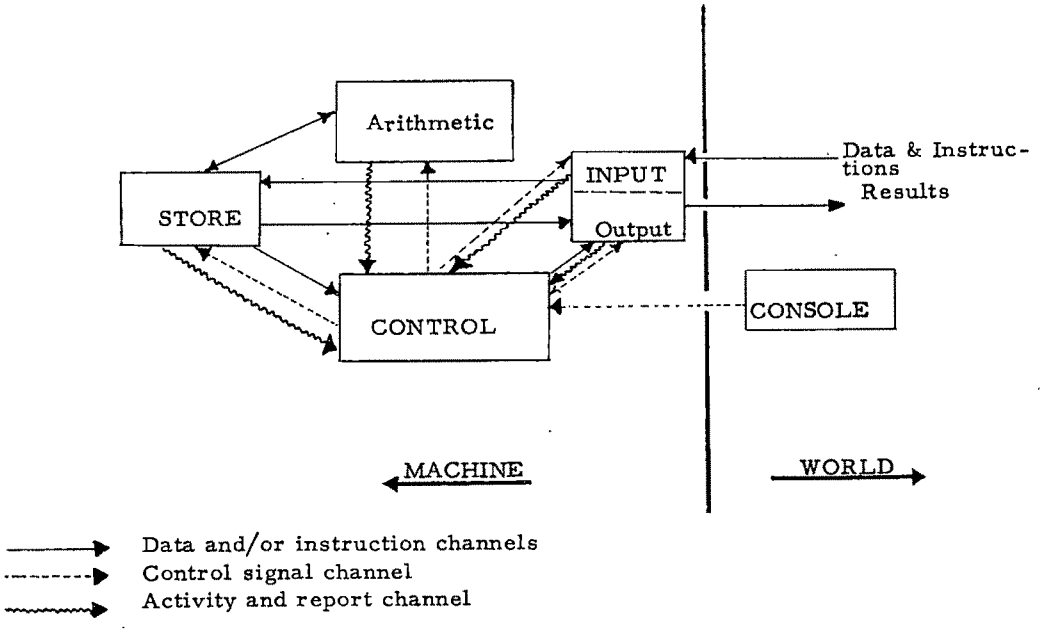


Figure 7

5.4 Making Computer Work

Very frequently a question is asked 'What can a computer do for us?' The answer is equally simple and glib 'Whatever you want it do." This question and the answer lead one to another important and closely related field called 'Programming'. Programming is an art and science of making a computer do a set of sequential operations to achieve a desired goal or result. This is simple and not a rigorous definition. However, it indicates the importance and amount of intellectual efforts necessary to solve a problem on computer. In fact, programming tries to simulate the intellectual procedure needed to solve a problem and design suitable set of instructions to the computer to solve the problem, accurately and speedily. This requires the proper formulation of the problem desired to be solved on the computer.

5.41 What Programming Is

In Programming, that is in writing the programme, an attempt is made to translate the details of a problem into a language, the machine can understand and work with. The programming work consists of the following steps

1 Formulating the Problem - Mostly problems are stated in terms of mathematical equations and problem numbers. Sometimes, a problem cannot be easily translated into a set of equations. In such cases other methods are used.

2 Analysing the Problem - the formulated problem and the equation are arranged in such a way that the desired results are achieved.

3 Planning - the actual 'mechanics' of the programming operation in which a detailed step-by-step plan of the operations is drawn up. At this stage the programme is carefully checked for errors.

4 Execution - the punching and feeding the programme in the machine.

5.42 Programme

The programme is only a set of permissible instructions grouped in such a way so as to solve a problem efficiently. Thus programme enables a computer to solve the complicated and involved problems by simple instructions alone.

5.43 Instruction Format

All information - instructions, problem numbers data etc - is in the same form i.e. group of digits. Each group or digit irrespective of what it represent is called

a computer word. There are two types of computer words: instruction words and not instruction words. An instruction word has the following format called instruction format.

OP Code No. Operation data address

OPERATION	P ADDRESS	Q Address

Operation code number - represents the command that the computer will follow.

Operation data address gives the memory address of the number word to be used during the operation.

P & Q Address specifies the core location in the memory from where the operands are to be taken.

5.44 Illustration

The dump out programme when written in machine language and on instruction format will read as follows:

OPERATION		INSTRUCTION		
S. N.		OPERATION CODE	P ADDRESS	Q ADDRESS
0	Number of digits	2	5	5
1	Rewind tape 0	34	00000	02004
2	Read the tape 0 in location 08001	37	08001	02000
3	Write from 08001 in memory on the console typewriter	39	08001	00100
4	Branch back to 00012 in the memory for the next instruction	49	00012	00000

For reading facility the operation code has been translated into the natural language. Normally the programme for the dump out world appear like

340000002004 37 08001 020003908001
0010049000120000 0

6 EXPERIMENTAL WORK

This much for the background of the union catalogue and the computer. The experimental work conducted at Kanpur consisted of the following jobs:

1 Master File on magnetic tape
2 Checking the Master File
3 Manipulating the Master

6.1 Master File

The source data was transferred on to the magnetic tape. The source data on the magnetic tape was referred to as the master file. After the transference of the data the source data was not used. Further manipulation was done only with the Master File.

6.11 Input Programme

The programme used for building the

master file is given in Appendix 1. The problem that was solved by this input programme was to put all the cards in the source data corresponding to an entry in the basic data together on the magnetic tape without any interrecord gap and to put an interrecord gap between the last card of this entry and the first card of the next entry. An interrecord gap is the empty tape space put automatically between two successive writing operations. This was achieved by using SPS (= Symbolic Programming Systems) language for programming.

6.12 Flow Diagram

Figure 8 gives the flow diagram. It was thought necessary to check the first and second card of every basic entry in the source data cards before transcribing to the magnetic tape.

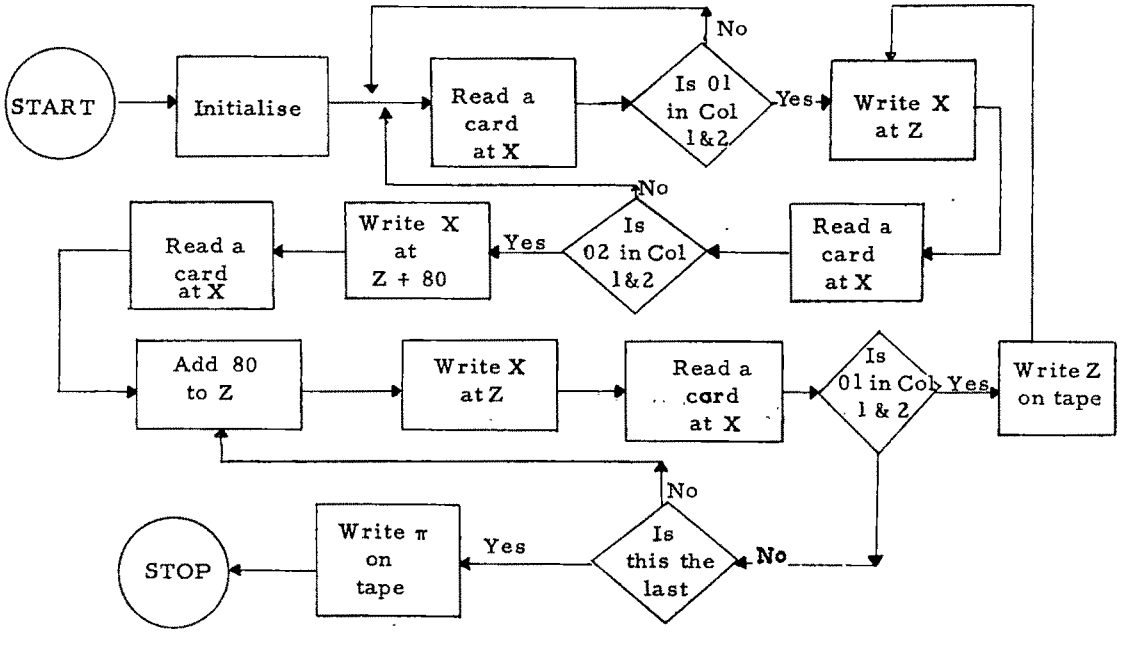


Figure 8

6.2 Checking the Master File

It was necessary to check the master file in order to ascertain whether or not the source data was being transcribed in the desired manner. The method used for doing this was to have a dump from the master file.

6.21 Dump-out Programme

The damp out programme was very simple and was written in machine language. In the natural language the programme consisted of the following steps

1 Rewind the Master tape file.
2 Read from Master file at X in Computer
3 Type out on Console type writer from X in the computer
4 Go to step 2

6.22 The Dump Out

The result of this programme were obtained on the console typewriter. A sample of the dump out has been given in the Appendix 2. It will be seen that this dump resembles the printed page of the union catalogue in some respects. There is no order or sequence in the master file.

6.3 Master File Manipulation

The master file was manipulated to give an alphabetic, geographical and chronological indexes. The results obtained were extremely accurate and very quick as compared to Manual handling. Out of these manipulations only the details of alphabetisation will be given.

6.31 Alphabetisation Programme

With this programme the information contained in the Master file was alphabetised. The programme designed has been given in Appendix 3. The programme contained about 265 machine instructions and nearly the entire memory was used up for this purpose. The language used for this programme was S. P. S.

6.32 Programme Execution

For the execution of the programme three tape units were used. The titles of the periodicals were copied on another tape from the master file. In principle, the entire title of the periodicals was read and compared with another and the lower one was transferred to another tape. This operation was repeated 96 times to obtain a complete alphabetised list.

6.33 Results

The results were available on either of the two intermediate tapes used for alphabetisation. The results have been given in Appendix 4. These results were obtained from the tape by an output programme.

6.34 Output Programme

The programme for taking out the results from the tape was written in machine language. In natural language the programme consisted of the following steps

1 Rewind the tape
2 Read a record from the tape at X in the memory
3 Punch X from the memory
4 Go to step 2 if the next record is not a record mark else stop.

6.35 Alphabetical Index

The cards punched by the computer were the alphabetic index to the master file. These were printed by the IBM 407 accounting machine. The printed copy was the hard copy which could be used for many purposes.

6.4 Problems

Although the experiment with its limitations can be pronounced as a success, yet the entire job was neither so simple nor so easy as it appears. Mentioned below are some of the problems that were faced during the experimentation.

6.41 Classification

Colon Classification has been used for clasifying Union Catalogue entries. No doubt, it is a very powerful and is the most modern classificatory thought developed so far, but the computer in its present state of development is not able to work with it. This is mainly because the scheme uses mixed notations in one and the same array. On a punched card an array of order n is represented in the (n+1) th column if the (BC) is represented on column 1. This difficulty is further accantuated by the lack of facilities available with IBM 1620 Data Processing System for lower case Roman alphabets and five connecting symbole used in the scheme.

The hierarchy of digits in CC is:

, ;:. 'a, b, ---y, z, 1, 2, ---8, 9, A, B, --- Y, Z. Whereas on computer it is b.)+$*-/, (@A, B, ---, Y, Z, 0, 1, ---8, 9.

It will be seen that the opposite hierarchy scales of digits poses a problem on computer and makes the use of Roman capitals and Indo-Arabic numerals in the same way entirely unhelpful. Another effect is that on the computer IAN appear later than the Roman Capital -- sequence just opposite to that demanded by CC. Moreover ; (semicolon) and : (colon) are not available on the computer. It is conjectured that the powerful concepts of 'Optional facets', 'Telescoping of arrays, and 'Telescoping of facets' are likely to create and complicate the problem. In this experiment these problems have not arisen.

6.42 Programming

The difficulties pertaining to programming were not many. Most of these were on account of lack of availability of a suitable compiler and a suitable language.

6.5 Solution

These problems did not hold up the progress of the experiment. The experimentation continued in spite of these problems. However, many ad hoc solutions were arrived at and were frequently used. Some of these are given below.

6.51 Classificatory

Classificatory problem is not at all serious so long as no sorting and sequencing

is desired by any part of the class number and the work is confined to the 02 card. But it became thwarting when an attempt at geographical and chronological sorting was made. This problem was overcome by the judicious use of 'delimiters' and fixing the facet field on the 01 cards of the source data. The sequencing problem according to space facet was avoided rather than solved on account of shortage of time. Although notational difficulties of CC were not experienced for the same reasons, it was felt that proper field fixation of facets would yield a temporary solution. A more permanent solution to the information processing problems would be to write a suitable compiler but it could not be done due to paucity of both experience and time.

6.52 Programming

The difficulties arising out of the absence of suitable language and a compiler were solved by using a more fundamental language i.e. SPS or Symbolic Programming System. Most of the deeper difficulties were solved by the able guidance of Prof. Rabinowitz and minor problems were solved by discussions with Prof. P. Purushottam - a class fellow.

7 OBSERVATION

7.1 Speed

Conversion of basic data into source data is essentially a manual operation. The speed of operation is slightly higher than that of typing an index card. The other operations are perfermed very fast by the computer except tape rewinding which happens to be much too slow from computer standards. However, from the manual standards these operations are very fast. The master file building took 3 1/2 minutes approximately. The alphabetisation took approximately 5 minutes computer time. The printing of results took little less than a minute. This gives some rough ideas about the speeds with which the computer can process non-arithmetical or natural language data.

7.2 Reliability

The reliability of results is entirely dependent on the source data. Any mistake at the source data stage is likely to be faithfully continued during and after operation. In other words, the computed operations are extremely reliable - as reliable as the source data for natural language data processing.

7.3 Accuracy

The accuracy of the results depends on the accuracy of the source data. If the source data is cent per cent accurate the results are also cent per cent accurate. Computers with high degree of precision are available. The one used for the experiment has a high degree of accuracy.

7.4 Versatility

The experiment demonstrated the versatility of the digital computer in one of the important aspects of documentation. It proved the value of computer in processing the Union Catalogue data efficiently and speedily. The computer can advantageously be used in preparing either a press copy or master copy for printing the Union Catalogue.

8 FUTURE

It has been rightly remarked that the computers have initiated a new movement a second industrial revolution. Computers are becoming more and more available not only for research purposes but in other walks of life. Computer has been used in the field of documentation in other countries. If India is not to be taken by surprise in this field, the time for work has arrived. The information storage and retrieval is a very fertile field where the computer can be effectively and advantageously used even in India where manpower is not so acute a problem as in west. The high speeds of operation with a high degree of precision and reliability; the capacity to communicate with the external world by electrical signals; the capability of taking simple logical decisions; the capacity of using large storage area on a very compact data storage media, the high speed selection and retrieval of stored information; and the adaptability to a wide variety of conditions influencing the source data, accumulation of data, the transmission of data and the processing of data for many purposes are likely to make computers a very useful and very efficient tool not only in the field of documentation but also in the other fields of data processing.

8.1 Insdoc's Role

The task for Insdoc should be to continue the experimentation in different problems of

documentation. The project team should test, evolve and develop suitable methods that will solve many immediate problems with high speed and high degree of precision. In doing so it should not try to change everything to suit computer. Instead an effort should be made to make computer do the desired thing in the desired way. This points to the fact that instead of working with already tested systems, experiment must commence from the very beginning. There is a pressing need for proper formulation of the problem of Information Retrieval. A reasonable inference from the published literature is that the information retrieval problem has been frequently solved but never formulated. The nature of the fundamental problems that arise in information retrieval has to be thoroughly investigated.

8.2 Immediate Work

Efforts should also be made to design a translator which will suit the information storage and retrieval problems in a neat, elegant and speedy way.

The present programmes have to be refined and better sorting sequencing methods have to be developed.

8.3 Future Potentiality

This experiment has shown the way for the future work. The master file could be efficiently used for speedy and accurate preparation of the following indexes to the Union Catalogue

1 Alphabetical index to the periodical included in the Union Catalogue;

2 Alphabetical list of participating libraries;

3 Classified list of the participating libraries;

4 Classified list of Union Catalogue

5 Alphabetical subject index to the Union Catalogue

6 Geographical list of periodicals included in the Union Catalogue;

7 Language list of periodicals included in the Union Catalogue; and

8 Preparation of regional and or city catalogues from the Union Cataloge etc.

In other words by using a computer it should be possible to publish Union Catalogue with these indexes in a short time with minimum of editorial and other time consuming works.

8.4 Application to Procurement Work

If additional information regarding the standard abbreviation of a periodical is added to the Union Catalogue entry, it will be possible to link up the document procurement work of Insdoc. In a suitably designed system, it will be possible to use master file either on tape or on magnetic disc for increasing the efficiency, accuracy of this service. Some rethinking is necessary before an experiment can be launched.

9 ACKNOWLEDGEMENT

Shri B.S. KESAVAN, Director, Insdoc; Dr. H.K. KESAVAN, Head Computer Centre; Prof. RABINOWITZ; and Shri P. PURUSHOTHAM of Guindy are the names of some of the important persons whose patronage, helping attitude and wise counsel have been a great solace during moments of despair. To thank them most gratefully and respectfully is deemed to be a great privilege. Prof. Rabinowitz who gave an insight into the computer and the necessary software is beyond all thanks. One is only filled with awe mixed with profound respect for his erudite learning and his charming exposition of the complicated subject like software or programming or algorithms.

Appendix 1

```
          DORG800
     X    DAS 81
     Z    DSS 16000,8000
     Y    DAC 1,'
     ORIGINK    ,02004
     START RACDX
          TF  X+160,Y
          SF  X-1
          CM  X+2,07071,8
          BNE START
     HERE  TR  Z,X-1
          RACDX
          SF  X-1
          TFM ALPHA+6,Z+160
          CM  X+2,07072,8
          BNE START
     ALPHA TR  Z+160,X-1,2
          AM  ALPHA+6,00160,9
          RACDX
          CM  X+2,07071,8
          BNE LCT
          WATOZ+1
          B   HERE
     LCT   BNLCALPHA
          K    ,02005
          K    ,02005
          H
          DENDORIGIN
360007200500360020100500440001200276260005900274250001100000260009000269   0000
2600095002643100000002002600114002742500000000114900012000000                  1
          DORG800                                                                2
0000000800                                                                  90003
     X    DAS 81                                                                4
0000000801  00081                                                           90005
     Z    DSS 16000,8000                                                        6
0000008000  16000                                                           90007
     Y    DAC 1,'                                                               8
0000000963  00001                                                           90009
000000Z                                                        060096200964 0001
     ORIGINK    ,02004                                                      00011
0000000964340000002004Z                                        J10096400976 R0012
     START RACDX                                                            00013
0000000976370080100500Z                                        J10097600988 R0014
          TF  X+160,Y                                                       00015
0000000988260096100963Z                                        J10098801000 R0016
          SF  X-1                                                           00017
0000001000320080000000Z                                        J10100001012 R0018
          CM  X+2,07071,8                                                   00019
0000001012140080 30P071Z                                       J10101201024 R002
          BNE START                                                         00021
0000001024470097601200Z                                        J10102401036 R0022
     HERE  TR  Z,X-1                                                        00023
0000001036310800000800Z                                        J10103601048 R0024
          RACDX                                                             00025
0000001048370080100500Z                                        J10104801060 R0026
          SF  X-1                                                           00027
0000001060320080000000Z                                        J10106001072 R0028
```

```
                                                                    IIT.  KANPUR    26/10/64
          TFM ALPHA+6,Z+160                                                  00029
0000001072160111408160Z                                        J10107201084 R003
          CM  X+2,07072,8                                                    00031
000000108414008030P072Z                                        J10108401096 R0032
          BNE START                                                          00033
0000001096470097601200Z                                        J10109601108 R0034
     ALPHA TR  Z+160,X-1,2                                                   00035
0000001108310816000800Z                                        J10110801120 R0036
          AM  ALPHA+6,00160,9                                                00037
0000001120110111400J60Z                                        J10112001132 R0038
          RACDX                                                              00039
0000001132370080100500Z                                        J10113201144 R004
                                                                             00041
000000114 140  0 0 07'7'                                       J10114401156 R0042
          BNE LCT                                                            00043
0000001156470119201200Z                                        J10115601168 R0044
          WATOZ+1                                                            00045
0000001168390800102000Z                                        J10116801180 R0046
          B   HERE                                                           00047
0000001180490103600000Z                                        J10118001192 R0048
     LCT  BNLCALPHA                                                          00049
0000001192470110800900Z                                        J10119201204 R005
          K    ,02005                                                        00051
0000001204340000002005Z                                        J10120401216 R0052
          K    ,02005                                                        00053
0000001216340000002005Z                                        J10121601228 R0054
          H                                                                  00055
0000001228480000000000Z                                        J10122801240 R0056
          DENDORIGIN                                                         00057
0000000964                                                                   90058
00000  L600000005004900000Z                                    080009600115 00059
3600100005003600172005003600244005003600316005003600000000500               0006
0000000000001020304000204060800030609021004080216100500151020060218142 00Z  00061
7041128200806142230090817263000000000050607080900121416181518112427202 42Z  00062
8223635203530454036324844553249465360484654627544536271601234567891234 56Z  00063
7890234567890J34567890JK4567890JKL567890JKLM67890JKLMN7890JKLMNO890JKLMNZ  00064
M8000000000049009640P90JKLMNOPQZ     L10038800019M90000000000M90003600000   00065
```

Appendix 2

```
01=J                *55     ,N5  +                                          05879
02  ABHANDLUNGEN,DEUTSCHEN AKADEMIE DER WISSENSCHAFTEN,BERLIN. KLASSE FUR   05879
031ANDWIRTSCHAFTLICHE WISSENSCHAFTEN.$                                      05879
04  1=1950C$                                                                05879
A1P1KOB          1C                                                         05879
A201BC           1956C                                                      05879
01=H2               *73     ,M   +                                          05268
02  TRANSACTIONS,AMERICAN INSTITUTE OF MINING ENGINEERS.$                   05268
03  FROM 59=1918 CONTINUED AS TRANSATIONS,AMERICAN INSTITUTE OF MINING AND 05268
04METALLURGICAL ENGINEERS. /FROM 1928 ISSUED AS TRANSACTIONS OF VARIOUS SEC05268
05TIONS/$                                                                   05268
A1P3BA           122,124,133,176,180,184-85,187-88,191,193,197              05268
A201BA1          1932-45                                                    05268
A301BF2/1-177,179-182,184,185,187,192,194/1-137,139-177,179-182,184-184,187 05268
A4-192,194C                                                                 05268
A501PD           187-89                                                     05268
A6R5DF1          204C                                                       05268
A7R6B3           31-76,139,146,151,153,163-98,208C                          05268
A8R7DH           5-75,138,141,161,165,179-83,190-92,196.                    05268
A9R7JF1          1C                                                         05268
B1R7JEF          184-87,190,205,211C                                       05268
B2S1RF           1960C                                                      05268
```

Appendix 3

```
                                 * ALPH   ABET   IC SORTING     INSDOC                2
00406     00005                  SWITCH   DC     5,00001                              4
00411     00005                  ILC      DC     5,00001                              7
00416     00005                  OLC      DC     5,00001                              1
00419     12000                  X        DAS    12000                                13
24419     00180                  TEMP     DAS    180                                  15
24782     00005                  TAPE0    DC     5,02000                              17
24787     00005                  TAPE1    DC     5,02100                              2
24792     00005                  TAPE2    DC     5,02200                              23
24795     00001                  RECDM    DAC    1,'                                  26
24800     00005                  FLC      DC     5,00002                              29
30000                                     DORG   30000                                32
30000 34 00000 02004             PROGA    K      00000,02004                          34
30012 34 00000 02104                      K      00000,02104                          36
30024 34 00000 02204                      K      00000,02204                          38
30036 37 00419 02000             READA    RAT0   X                                    4
30048 26 24802 24795                      TF     FLC+2,RECDM                          42
30060 37 00819 02000             READB    RAT0   X+400                                44
30072 26 00739 24795                      TF     X+320,RECDM                          46
30084 26 01139 24795                      TF     X+720,RECDM                          48
30096 32 00578 00000                      SF     X+159                                5
30108 32 00978 00000                      SF     X+559                                52
30120 11 00411  0001                      AM     ILC,00001                            54
30132 24 00727 01127                      C      X+308,X 708                          56
30144 46 30204 01100                      BH     HIGH                                 58
30156 46 30240 01200                      BE     EQUAL                                6
30168 39 00579 02100             LOW      WAT1   X+160                                62
30180 31 24418 00978                      TR     TEMP-1,X+559                         64
30192 49 30276 00000                      B      LOOPI                                66
30204 39 00979 02100             HIGH     WAT1   X+560                                68
30216 31 24418 00578                      TR     TEMP-1,X+159                         7
30228 49 30276 00000                      B      LOOPI                                72
30240 39 00579 02100             EQUAL    WAT1   X+160                                74
30252 31 24418 00978                      TR     TEMP-1,X+559                         76
30264 49 30276 00000                      B      LOOPI                                78
30276 11 00411  0001             LOOPI    AM     ILC,00001                            8
30288 37 00419 02000             READC    RAT0   X                                    82
30300 32 00578 00000                      SF     X+159                                84
30312 26 00739 24795                      TF     X+320,RECDM                          86
30324 24 24567 00727                      C      TEMP+148,X+308                       88
30336 46 30396 01100                      BH     HHIGH                                9
30348 46 30420 01200                      BE     EEQUAL                               92
30360 39 24419 02100             LLOW     WAT1   TEMP                                 94
30372 31 24418 00578                      TR     TEMP-1,X+159                         96
30384 49 30456 00000                      B      TESTI                                98
30396 39 00579 02100             HHIGH    WAT1   X+160                              01
30408 49 30456 00000                      B      TESTI                              01 2
30420 39 24419 02100             EEQUAL   WAT1   TEMP                               01 4
30432 31 24418 00578                      TR     TEMP-1,X+159                       01 6
30444 49 30456 00000                      B      TESTI                              01 8
30456 14 00411  0090             TESTI    CM     ILC,00090                          011
30468 47 30276 01300                      BL     LOOPI                              0112
30480 34 00000 02104             PROGB    K      00000,02104                        0114
30492 34 00000 02204                      K      00000,02204                        0116
                                 RRRA     RAT1   X                                  0118
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30504 37 00419 02100
30516 37 00819 02100        RRRB     RAT1   X+400                          012
30528 26 00579 24795                 TF     X+160,RECDM                    0122
30540 26 00979 24795                 TF     X+560,RECDM                    0124
30552 32 00418 00000                 SF     X-1                            0126
30564 32 00818 00000                 SF     X+399                          0128
30576 11 00416  0001                 AM     OLC,00001                      013
30588 24 00567 00967                 C      X+148,X 548                    0132
30600 46 30660 01100                 BH     OHIGH                          0134
30612 46 30696 01200                 BE     OEQUAL                         0136
30624 39 00419 02200        OLOW     WAT2   X                              0138
30636 31 24418 00818                 TR     TEMP-1,X+399                   014
30648 49 30732 00000                 B      LOOPO                          0142
30660 39 00819 02200        OHIGH    WAT2   X+400                          0144
30672 31 24418 00418                 TR     TEMP-1,X-1                     0146
30684 49 30732 00000                 B      LOOPO                          0148
30696 39 00419 02200        OEQUAL   WAT2   X                              015
30708 31 24418 00818                 TR     TEMP-1,X+399                   0152
30720 49 30732 00000                 B      LOOPO                          0154
30732 11 00416  0001        LOOPO    AM     OLC,00001                      0156
30744 37 00419 02100        RRRC     RAT1   X                              0158
30756 32 00418 00000                 SF     X-1                            016
30768 26 00579 24795                 TF     X+160,RECDM                    0162
30780 24 24567 00567                 C      TEMP+148,X+148                 0164
30792 46 30852 01100                 BH     HIGHO                          0166
30804 46 30876 01200                 BE     EQUALO                         0168
30816 39 24419 02200        LOWO     WAT2   TEMP                           017
30828 31 24418 00418                 TR     TEMP-1,X-1                     0172
30840 49 30912 00000                 B      TESTO                          0174
30852 39 00419 02200        HIGHO    WAT2   X                              0176
30864 49 30912 00000                 B      TESTO                          0178
30876 39 24419 02200        EQUALO   WAT2   TEMP                           018
30888 31 24418 00418                 TR     TEMP-1,X-1                     0182
30900 49 30912 00000                 B      TESTO                          0184
30912 14 00416  0090        TESTO    CM     OLC,00090                      0186
30924 47 30732 01300                 BL     LOOPO                          0188
30936 14 24800  0090                 CM     FLC,00090                      019
30948 47 30972 01300                 BL     BAN                            0192
30960 48 00000 00000                 H                                     0194
30972 14 00406  0002        BAN      CM     SWITCH,00002                   0196
30984 47 31008 01300                 BL     CHANGE                         0198
30996 46 31176 01200                 BE     ALTER                          02
31008 26 30515 24792        CHANGE   TF     RRRA+11,TAPE2                  02 2
31020 26 30527 24792                 TF     RRRB+11,TAPE2                  02 4
31032 26 30755 24792                 TF     RRRC+11,TAPE2                  02 6
31044 26 30635 24787                 TF     OLOW+11,TAPE1                  02 8
31056 26 30671 24787                 TF     OHIGH+11,TAPE1                 021
31068 26 30707 24787                 TF     OEQUAL+11,TAPE1                0212
31080 26 30827 24787                 TF     LOWO+11,TAPE1                  0214
31092 26 30863 24787                 TF     HIGHO+11,TAPE1                 0216
31104 26 30887 24787                 TF     EQUALO+11,TAPE1                0218
31116 11 00406  0001                 AM     SWITCH,00001                   022
31128 11 24800  0001                 AM     FLC,00001                      0222
31140 36 24796 00100                 RNTY   F C=4                          0224
31152 16 00416  0001                 TFM    OLC,00001                      0226
                                     B      PROGB                          0228
```

```
31164 49 30480 00000
31176 26 30515 24787        ALTER   TF     RRRA+11,TAPE1                    023
31188 26 30527 24787                TF     RRRB+11,TAPE1                    0232
31200 26 30755 24787                TF     RRRC+11,TAPE1                    0234
31212 26 30635 24792                TF     OLOW+11,TAPE2                    0236
31224 26 30671 24792                TF     OHIGH+11,TAPE2                   0238
31236 26 30707 24792                TF     OEQUAL+11,TAPE2                  024
31248 26 30827 24792                TF     LOWO+11,TAPE2                    0242
31260 26 30887 24792                TF     EQUALO+11,TAPE2                  0244
31272 26 30863 24792                TF     HIGHO+11,TAPE2                   0246
31284 12 00406  0001                SM     SWITCH,00001                     0248
31296 11 24800  0001                AM     FLC,00001                        025
31308 16 00416  0001                TFM    OLC,00001                        0252
31320 49 30480 00000                B      PROGB                            0254
30000                               DEND   PROGA                            0256
```

```
00406 *SWITCH  00411   ILC     00416    OLC     00419   X       24419   TEMP
24782   TAPEO  24787   TAPE1   24792    TAPE2   24795   RECDM   24800   FLC
30000   PROGA  30036   READA   30060    READB   30168   LOW     30204   HIGH
30240   EQUAL  30276   LOOPI   30288    READC   30360   LLOW    30396   HHIGH
30420 *EEQUAL  30456   TESTI   30480    PROGB   30504   RRRA    30516   RRRB
30624   OLOW   30660   OHIGH   30646  *OEQUAL   30732   LOOPO   30744   RRRC
30816   LOWO   30852   HIGHO   30876  *EQUALO   30912   TESTO   30972   BAN
31008 *CHANGE  31176   ALTER        Z
```

Appendix 4

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02  ABHANDLUNGEN,DEUTSCHEN AKADEMIE DER WISSENSCHAFTEN,BERLIN. KLASSE FUR  05879
02  ABSTRACTS OF PUBLISHED PAPERS AND LIST OF TRANSLATIONS. (COMMONWEALTH     31
02  AERONAUTICAL JOURNAL. (AERONAUTICAL SOCIETY OF GREAT BRITAIN).$        02566
02  ANNALEN DER PHYSIK.$                                                   01615
02  ANNALES DE PHYSIQUE.$                                                  016 6
02  ANNALES DES SCIENCES NATURELLES. ZOOLOGIE ET BIOLOGIE ANIMALE.$        07022
02  ANNALI,  SOCIETA AGRARIA DI TORINO.$                                   05823
02  ARCHIVES ROUMAINES DE PATHOLOGIE EXPERIMENTALE ET MICROBIOLOGIE. (BUCHA08189
02  ARCHIVES,INSTITUTSPASTEUR D,INDOCHINE. (INSTITUT PASTEUR DE SAIGON AND 0853
02  BACTERIOLOGICAL REVIEWS. (SOCIETY OF AMERICAN BACTERIOLOGIST).$        04785
02  BELL SYSTEM TECHNICAL JOURNAL. (BELL TELEPHONE LABORATORIES)$          03218
02  BERICHT,SENCKENBERGISCHE NATURFORSCHENDE GESELLSCHAFT IN FRANKFURT ON  04446
02  BIMONTHLY BULLETIN, AMERICAN INSTITUTE OF MINING ENGINEERS.$           05269
02  BIOCHEMISCHES CENTRALBLATT.$                                           03585
02  BRITISH JOURNAL OF OPHTHALMOLOGY.$                                     0864
02  BULLETIN,CENTRAL BUILDING RESEARCH INSTITUTE.$                         02162
02  BULLETIN,SOCIETE CHIMIQUE DE PARIS.$                                   03343
02  BULLETIN,SOCIETE MATHEMATIQUE DE FRANCE.$                              00731
02  CHALMERS TEKNISKA HOGSKOLAS HANDLINGAR. (=TRANSACTIONS,CHALMERS UNIVER 01934
02  CHEMICAL REVIEWS. (AMERICAN CHEMICAL SOCIETY).$                        03419
02  CHEMISCHE FABRIK.(=ZEITSCHRIFT DES VEREINS DEUTSCHER CHEMIKER TEIL B).$03653
02  COMMENTARII MATHEMATICI HELVETICI.$                                    00814
02  DESIGN AND WORK.$                                                      02645
02  DOKLADY, ROSSISKAIA AKADEMIIA NAUK (AKADEMIIA NAUK SSSR. ), LENINGRAD.$00375
02  ENGINEERING. LONDON.$                                                  019 9
02  HELVETICA CHIMICA ACTA. (SCHWEIZERISCHE CHEMISCHE GESELLSCHAFT).$      034 6
02  INDIAN FOREST RECORDS.$                                                06855
02  INDIAN JOURNAL OF CHILD HEALTH. (ASSOCIATION OF PEDIATRICIANS OF INDIA)08875
02  INDIAN JOURNAL OF DAIRY SCIENCE. (INDIAN DAIRY SCIENCE ASSOCIATION).$  09496
02  INDIAN JOURNAL OF OCEUPATIONAL HEALTH. (SOCIETY FOR STUDY OF INDUSTRIAL090 6
02  INDIAN JOURNAL OF PHYSIOLOGY AND PHARMACOLOGY. (ASSOCIATION OF PHYSIOL09069
02  INDIAN JOURNAL OF PSYCHOLOGY(INDIAN PSYCHOLOGICAL ASSOCIATION)$        09676
02  IZVESTIIA,AKADEMIIA NAUK SSSR. OTDELENIIA MATEMATICHESKIKH I ESTESTVENN04913
02  IZVESTIIA,BIOLOGICHESKOGO NAUCHNO-ISSLEDOVTELSKOGO INSTITUTA I BIOLOGIC04513
02  IZVESTIIA,PETROVSKAIIA ZEMLEDELCHESKAIA AKADEMIIA.$                    05929
02  JOURNAL OF COMPARITIVE NEUROLOGY.$                                     088 8
02  JOURNAL OF GENERAL MICROBIOLOGY. (LOCIETY FOR GENERAL MICROBIOLOGY).$  04774
02  JOURNAL OF PHOTOGRAPHIC SCIENCE.(ROYAL PHOTOGRAPHIC SOCIETY OF GREAT  $09398
02  JOURNAL OF PHYSIQUE THEORIQUE ET APLIQUEE. (SOCIETE FRANCAISE DE PHYSIQ016 7
02  JOURNAL, PHYSICALSOCIETY OF JAPAN.$                                    01589
02  JOURNAL,ASSOCIATION OF MEDICAL WOMEN IN INDIA.$                        08917
02  JOURNAL,INDIAN CHEMICAL SOCIETY. INDUSTRIAL AND NEWS EDITION.$         03626
02  JOURNAL,INDIAN INSTITUTE OF ARCHITECTS.$                               09617
02  JOURNAL,INSTITUTION OF ELECTRICAL ENGINEERS. PT 3. RADIO AND COMMUNICAT03084
02  JOURNAL,SAPPORO AGRICULTURAL COLLEGE.$                                 05692
02  LANCET. LONDON.$                                                       07734
02  LIVERPOOL PHOTOGRAPHIC JOURNAL.$                                       09395
02  MEMOIRES, SOCIETE DES SCIENCES NATURELLES, CHERBOURG.$                 00234
02  MEMOIRES,SOCIETE DE CHIRURGIE DE PARIS.$                               08275
02  MEMOIRS,GEOLOGICAL SURVEY OF INDIA.$                                   04844
02  MEMOIRS,SOCIETY FOR ENDOCRINOLOGY.                                     08768
02  MILITARY DIGEST.(MINISTRY OF NO. 1=1947C$                              09544
02  MINERALOGISCHE MITTEILUNGEN.$                                          04023
02  MONTHLY NOTICES,ROYAL ASTRONOMICAL SOCIETY OF LONDON.$                 011 8
02  MONTPELLIER MEDICAL.$                                                  07694
02  NIHON KAGAKU ZASSHI. (=JOUPNAL,CHEMICAL SOCIETY OF JAPAN,PURE CHEMISTRY03323
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02 NUOVO CIMENTO. (SOCIETA ITALIANA DI FISICA).$ 016 1
02 NUTRITIONAL REVIEWS. (NUTRITION FOUNDATION).$ 08596
02 PHILIPS RESEARCH REPORTS.$ 00448
02 PHILOSOPHICAL MAGAZINE.$ 003 3
02 PROCEEDINGS,ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYO03273
02 PROCEEDINGS,AUSTRALASIAN INSTITUTE OF MINING ENGINEERS.$ 05292
02 PROCEEDINGS,UNITED SERVICE INSTITUTION OF INDIA.$ 09543
02 PROGRESS OF THEORETICAL PHYSICS. (ALSO AS RIRON BUTSURIGAKU NO SHIMPO) 0159
02 RUSSKII ASTRONOMICHESKII ZHURNAL.$ 01193
02 SCHWEIZERISCHE BAUZEITUNG. (=REVUE POLYTECHNIQUE SUISSE). (SCHWEIZERISC022 3
02 SHOKUBUTSU-GAKU ZASSHI(=BOTANICAL MAGAZINE). (NIHON SHOKUBUTSU GAKKAI= 05343
02 SITZUNGSBERICHTE DER MATHEMATISCHPHYSIKALISCHE KLASSE, KONIGLICHE BAYER00263
02 SUOMEN PAPERI-JA PUUTA. VAPALEHTI(=PAPPERS OCH TRAVARU TIDSKRIFT FOR FI092
02 TEXTILBERICHTE IIBER WISSENSCHAFT,INDUSTRIE UND HANDEL.$ 09316
02 THORAX. (BRITISH MEDICAL ASSOCIATION).$ 08616
02 TRANSACTIONS,AMERICAN INSTITUTE OF MINING ENGINEERS.$ 05268
02 TRANSACTIONS,AMERICAN MATHEMATICAL SOCIETY.$ 00839
02 TRANSACTIONS,AMERICAN MATHEMATICAL SOCIETY.$ 00839
02 ZA SOTSIALISTICHESKIUK SELSKOHOZIAISTVENNUIK NAUKU. (CESKOSLOVENSKA AKA05946
02 ZAPISKI,MINERALOGICHESKOE OBSHCHESTVO.$ 05029
02 ZAPISKI,MOSKOVSKOE OBSCHESTVO ISPITATELI PRIRODI.$ 045 8
02 ZEITSCHRIFT FUR ANGEWANDTE CHEMIE.$ 0365
02 ZEITSCHRIFT FUR ANORGANISCHE CHEMIE.$ 03527
02 ZEITSCHRIFT FUR DIE GESAMTE TEXTILINDUSTUE.$ 09315
02 ZEITSCHRIFT FUR ELEKTROTECHNIK UND ELEKTROCHEMIE.$ 03481
02 ZEITSCHRIFT FUR HYGIENE.$ 08455
02 ZEITSCHRIFT FUR PFLANZENERNAHRUNG UND DUNGUNG. A. WISSENSCHAFTLICHER 06363
02 ZEITSCHRIFT FUR PHYSIK. (DEUTSCHE PHYSIKALISCHE GESELLSCHAFT).$ 01623
02 ZEITSCHRIFT FUR VITAMINFORSCHUNG.$ 03566
02 ZEITSCHRIFT FUR ZELLEN UND GEWEBELEHRE.$ 04742
02 ZENTRALBLATT FUR DIE GESAMTE HYGIENE UND IHRE GRENZGEBIETE.$ 08457
02 ZHURNAL EKSPERIMENTALNOI I TEORETICHESKOII FIZIKI. (AKADEMIIA NAUK SSSR0165
02 ZHURNAL TEKHNICHESKOI FIZIKI. (AKADEMIA NAUK SSSR)$ 01652
02 ZOOLOGISCHER ANZEIGER. (DEUTSCHE ZOOLOGISCHE GESSELLSCHAFT).$ 07034

UNION LIST OF PERIODICALS!

A PUNCH-CARD MODEL

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A HALDER+

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Calls for greater co-operation and co-ordination amongst the libraries and documentation centres in India in view of our dependence on foreign literature and rapid growth of world literature. Union catalogue of periodicals is a basic tool for planning such national co-operation. A model is presented for the quick compilation and revision of a union catalogue on 80-column punch-card. Out of 80 columns only 60 columns have been used, as library holdings have not been taken into consideration in this model. Detailed analysis of work relating to coding, punching and programming of the sorter, collator and tabulator machines have been presented.

Introduction

For rapid handling of the growing masses of literature much attention and thought have been devoted, particularly in USA and USSR, to the development of automatic retrieval of bibliographical information using filmstrip, minicard (photo-electric sorting mechanism), punch-card (ICT, IBM), punch-tape (teleprinter type), magnetic tape (Deuce computer), high speed digital computer (electronic) and such other machine methods. But the machines which appear to be capable of doing higher order of bibliographical work than have been achieved in the past can serve only to do more of what we have been able to do in the past, perhaps, doing it faster and cheaper and perhaps not, until we learn just what it is and what we need to achieve so that we know how to instruct the machines.

At the International Conference of Scientific Information (ICSI) in 1958, when the problem of machine retrieval was discussed, the panel of experts could record very little advancement and concluded with the recommendations that the complex problem of comparing the characteristics of the existing problems as well as intellectual problems in the design of new systems of storage and retrieval need to be encouraged but the theory must grow by stages. It would be well to develop limited and specialized theories for individual areas by work or over simplified mathematical models and other simplified approaches.

The librarians and documentalists in India have so far given attention to deeper analysis in indexing and experimentations of faceted classification. In the absence of adequate facilities for the use of punch-card and other machine methods for bibliographical work very little experiments have been made in this direction. It is desirable that considering the rapid growth of world literature and when we are entirely dependent on foreign literature for education and research we should develop greater co-operation and co-ordination amongst the libraries and documentation centres.

Union Catalogue of Periodiclas in India

Union catalogue of periodicals is one of the basic bibliographical tools for planning such cooperation. Shortage of foreign currency in India also calls for the maximum utilization of funds. Such a Union list can help not only in the promotion of research work but also of national economy. The Union catalogues of periodicals published so far in India have been the result of the initiative taken by a few individuals and are somewhat incomplete.

* Library

+ Data Processing Unit, Research & Training School

! Paper presented at the 3rd IASLIC Conference, Poona 1963

The Union catalogue of learned periodical publications in South Asia, vol. 1 (Physical and biological sciences) appeared in 1953 on the basis of data collected in 1949 and 1950. Since the publication of this Union catalogue in 1953 many changes have taken place which changed the pattern and holdings of periodical resources available in the country.

The Indian Statistical Institute published a Union list of learned periodicals (Calcutta region) in 1959 compiled on the basis of returns available for 1957. The revisions could not be published timely for shortage of staff.

The Insdoc has taken the initiative of compilation of a Union catalogue of scientific periodicals and working on the project for the last five years. The first circular for library returns was issued in September 1958 but the catalogue is still in the process of compilation and yet to be published.

When such time lag between the date of the library returns and publication of the catalogue is very wide the usefulness of the catalogue is lowered. The Union catalogue should complete compilation and processing as quickly as possible and should bring out supplements at regular intervals to avoid limitations.

Union List - Purpose and Work Phase

The main purpose of a Union list is to facilitate inter-library loan amongst the participating libraries and to help those libraries to refrain from duplication of periodicals, where avoidable, in the interest of national economy. With these objectives in view a Union list should be so constructed as to indicate the location of a periodical when the title, or the name of the sponsoring body, or the subject is known.

The successive stages for the preparation of a Union list of periodicals are as follows:

1 Formulation of the policy and the scope of the list;

2 Procurement of returns from various libraries;

3 Compilation; and

4 Printing and publishing.

Punch-Card Model

The Indian Statistical Institute Library is carrying on experiments in collaboration with the Data Processing Unit of the Institute where a long range of punch-card machines are available on the use of punch-card methods for the third stage (compilation) in the preparation of a Union list of periodicals.

On the basis of experiments a model has been designed for encoding the data on 80-column punch-card restricting the elements to:

1 Title of the periodical;
2 Place of publication;
3 Language;
4 Frequency of publication;
5 Subject matter; and
6 Location.

Library holdings have been left out to present the machine design and coding in a simpler form. In the present design we have used only 60-columns out of 80. Library holdings could be punched on the remaining 20-columns or on a second card, if necessary, and the machine may print the list with individual library holdings when instructed. The programming and design will be somehow different and more complicated.

Machine Method - Primary

Step I: Transcription of data

The returns from libraries are first scrutinized and then the entry elements are encoded according to the schedule prepared for the purpose (Appendix I). The coded entries from individual returns are transferred to cards according to the following design with the help of a punching machine with alphabetic key board (type IBM 024).

Card design

description	Num/Alpha	Cols. reqd.	Card cols.
Identification no.	Num	3	1 - 3
Subject matter	Num	6	4 - 9
Title	Alpha	40	10 - 49
Frequency	Num	1	50
Place of publication	Alpha	5	51 - 55
Language	Alpha	2	56 - 57
Location	Alpha	3	58 - 60

After transferring the information, the cards are verified with a similar type of alpha machine.

A specimen punched card is presented in Appendix II.

Step II: Arrangement and listing

1 The cards are sorted by title of the periodical;

2 The first cards under each title are selected out. In the same run the cards are also checked for ascending order;

3 These selected first cards are then reproduced after omitting the library code. In column 80 code '9' is gang punched. A running serial number is then punched on these reproduced cards;

4 The new set of reproduced cards together with the selected first cards are then filed into the original pack in title order; and

5 This merged check is then passed through the tabulator to get the Union list of periodicals. The cards are then filed for future use.

Revision of Union list of Periodicals

Like any other printed catalogue a Union list of periodicals too goes out-of-date by the time it is published, mainly due to (i) New in-take and (ii) Discontinuation of periodicals.

To maintain a Union list of periodicals perpetually up-to-date, a rigorous routine should be followed to bring out supplements or quick revisions at regular intervals with a strict time-table.

Machine Method-Revision

To obtain the returns quickly the primary cards are sorted by library and a list for each individual library is prepared and sent for revision.

Step I

After the revised returns from libraries are received, scrutinized and encoded it is necessary to punch entries for

i) New; and
ii) Discontinued periodicals

For the discontinued periodicals punch 'X' in column 78.

Step II

1 These newly punched cards are then sorted by Library x Title of the periodical. The cards are next separated into two packs; Pack A - new and Pack B - discontinued.

2 The discontinued cards are removed from the primary deck by comparing with pack B. New cards (Pack A) are filed into the primary deck.

3 This revised deck is then sorted by Title of the periodical.

All the processes as indicated in Step II for the primary list are then to be followed.

The schematic diagrams of the work flow for the Union list of periodicals primary and revised are presented in Appendices III & IV.

Specimen copies of Union list of periodicals and individual library returns are presented in Appendices V & VI.

Explanation of the wiring diagram

The listing and printing of the Union list of periodicals is made with the help of IBM tabulator (type 421). The salient points of the wiring are given below:

Connections from

1. Upper brush column 80
2. Second reading cols. 4-6, 10-49, 51-55, 56-57, 50
3. Second reading (Library code) cols. 58-60
4. Card cycle through normal side of selector 2 which is picked up (D pick up) by the transfer side of first card M1
5. Normal side of First card minor

Connected to

Programme start M1 via digit selector (impulse 9)
List print entry
53-55, 1-40, 42-46, 48-49, 51
Total print entry via selectors by cycling* (also connected to Alpha print control)

Space suppress

Print control

*Cycling should stop at each control break. For this purpose one selector is picked up for each master card by energising "All step" pick up hub.

Time estimates (on the basis of total volume of 20000 cards).

Primary - Step I

Punching and verification ... 600 man hours (approx.)

Step II

Name of machine	Card passage in 000	Approx. hours reqd.
Sorter	1620	81
Collator	40	8
Reproducer	3	1
Tabulator	46	15

A short description of different punch-card machines used is presented in Appendix VII.

Viability

It has been mentioned earlier that if the time lag between the date of library returns and publication of the list is not minimum and revision of such lists are not done at regular intervals the usefulness of Union lists is much lowered, it will be evident that preparation of Union lists with the help of punch-card methods will serve the above. Other, such as, subject, country, language etc. and the index may be obtained from the same design at nominal cost.

It is well known that the machine methods can be used with advantage only when the volume of data in considerably large. In India there is no such individual library or documentation centre which can independently exploit machine methods. But for cooperative projects like the preparation of Union catalogue of periodicals comprehensive bibliographies and indexes at national or regional level, retrospective subject bibliographies, etc. the machine methods may perhaps be more efficient and economical, particularly when the available resources and range of machines in the existing Data Processing establishments in the country could be exploited.

Appendix I

Schedule of Codes for the Entry Elements

	Name of Library	Code
(A)	Indian Association for the Cultivation of Science	ACS
	Anthropological Survey of India	ANS
	Bengal Engineering College	BEC
	Botanical Survey of India	BSI
	Central Fuel Research Institute	FRI
	Geolcgical Survey of India	GSI
	Institute of Nuclear Physics	INP
	Indian Statistical Institute	ISI
	Indian Jute Mills Association Research Institute	JMA
	National Library	NL

	Language	Code
(B)	English	E
	French	F
	German	G

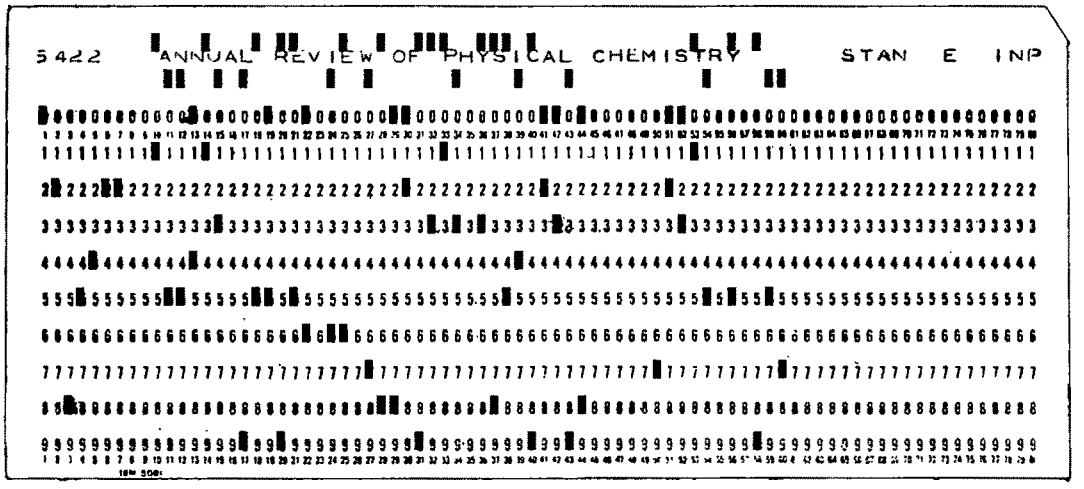
Japanese	J
Russian	R
Bi-lingual	BL
Multi-lingual	ML

(C) Frequency of Publication	Code
Weekly	1
Semi-monthly	2
Monthly	3
Bi-monthly	4
Quarterly	5
Semi-annual	6
Annual	7
Irregular	8

(D) Place of Publication	Code
Aberdeen	Aberd
Allahabad	Allah
Baltimore	Balt
Bangalore	Bang
Brussells	Bruss
Calcutta	Cal
Chicago	Chic
Cleveland	Cleve
Ivanston	Ivans
Lahore	Lahor
London	Lond
Michigan	Mich
Moscow	Mosco
New York	NY
Ottawa	Ott
Philadelphia	Phil
Princeton	Princ
Stuttgart	Stutt
Washington	Wash

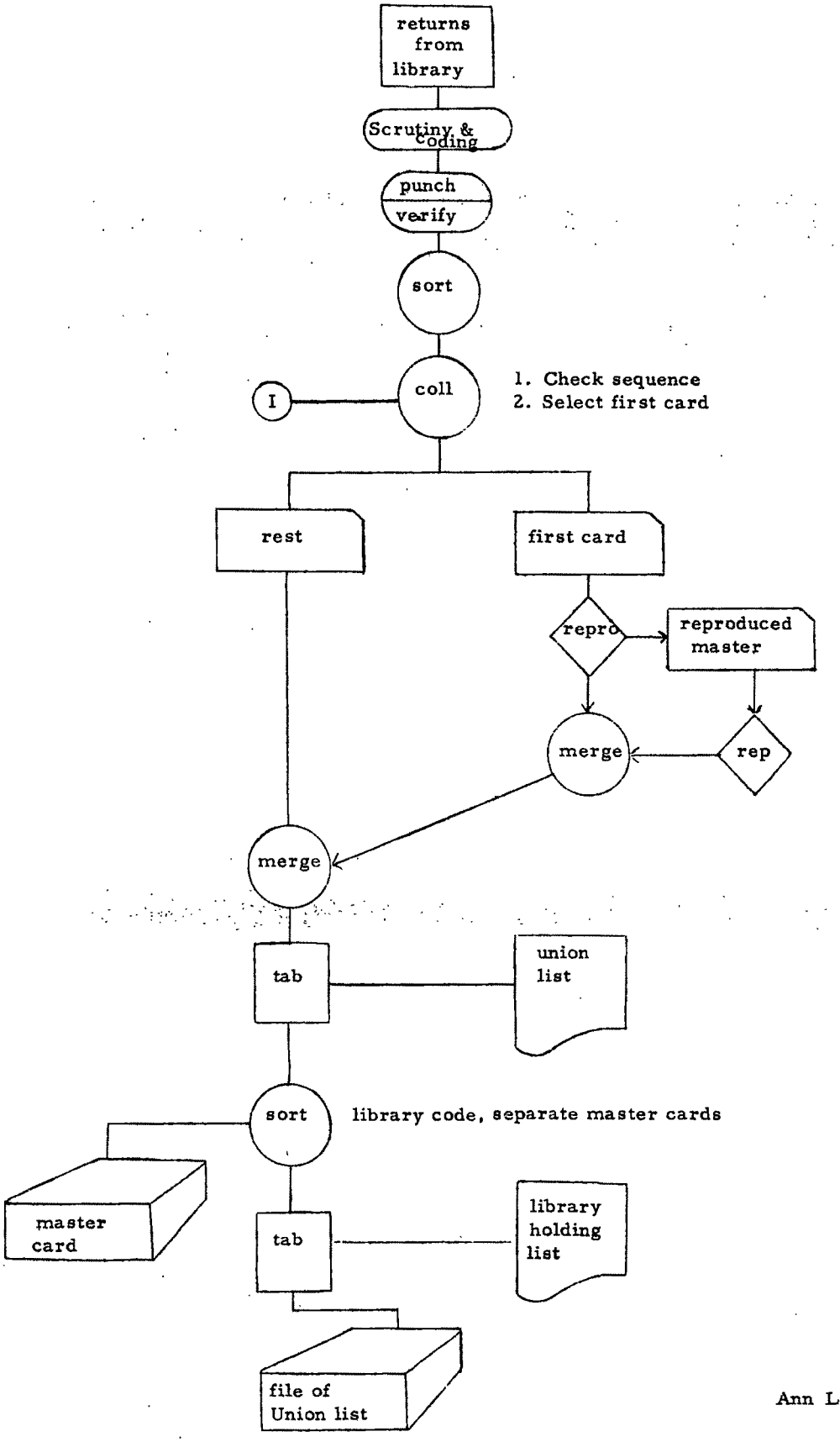
Appendix II

Specimen Punched Card



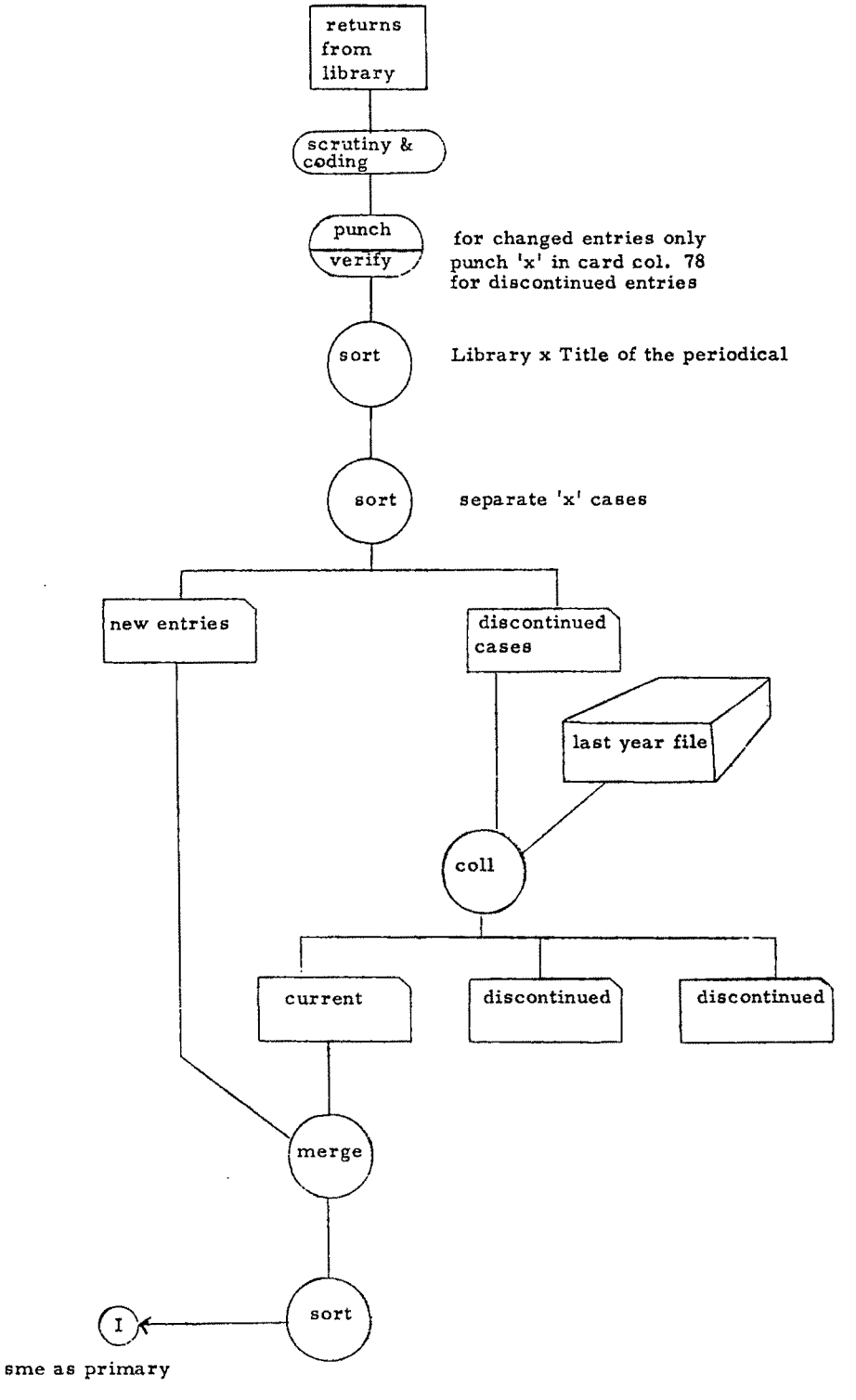
Appendix III

Work flow : Union List - Primary



Appendix IV

Work flow : Union List - Revision



Appendix V

Union list of periodicals

NATURE ACS BEC BSI ANS FRI GSI INP ISI JMA NL	LOND	E	1	500	1
NUTRITION ABSTRACTS AND REVIEWS ANS ISI	ABERD	E	5	612	2
OPERATIONAL RESEARCH QUARTERLY ISI	LOND	E	5	658	3
OPTICAL SOCIETY OF AMERICA JOURNAL ACS FRI	NY	E	3	535	4
PAKISTAN JOURNAL OF SCIENCE JMA NL	LAHOR	E	4	500	5
PALAEONTOGRAPHICA GSI	STUTTG		8	560	6
PHYTOMORPHOLOGY BSI	DELHI	ML	8	581	7
PRIKLADNAYA MATEMATIKA I MEKHANIKA ACS	MOSCO	R	4	510	8
PROGRESS OF THEORETICAL PHYSICS ACS INP	KYOTO	J	3	530	9
PSYCHOMETRIKA ANS ISI NL	PRINC	E	5	159	10
QTY JOUR OF MECHANICS AND APPLIED MATHE ISI	LOND	E	5	531	11
REVIEW OF MODERN PHYSICS ACS BEC FRI INP	NY	E	5	530	12

Appendix VI

Library holding list

AGRICULTURAL ECONOMICS RESEARCH	WASH	E	5	631	1
AGRICULTURAL SITUATION IN INDIA	DELHI	E	3	633	2
AKADEMIYA NAUK SSSR DOKLADY	MOSCO	R	1	500	3
ALLAHABAD FARMER	ALLAH	E	4	631	4
AMERICAN DOCUMENTATION	CLEVE	E	5	025	5
AMERICAN ECONOMIC REVIEW	IVANS	E	5	330	6
AMERICAN JOURNAL OF HUMAN GENETICS	BALT	E	5	575	7
AMERICAN JOURNAL OF PHYSICAL ANTHROPOLO	PHIL	E	5	572	8
AMERICAN JOURNAL OF SOCIOLOGY	CHIC	E	4	301	9
AMERICAN STATISTICAL ASSOCIATION JOURNAL	WASH	E	5	311	10
ANNALS OF LIBRARY SCIENCE	DELHI	E	5	025	11
ANNALS OF MATHEMATICAL STATISTICS	MICH	E	5	311	12
ASLIB PROCEEDINGS	LOND	E	5	025	13
BELL LABORATORIES RECORD	NY	E	3	623	14
BIOMETRIKA	LOND	E	6	574	15
BRITISH BOOK NEWS	LOND	E	3	017	16
BRITISH JOURNAL EXPERIMENTAL PATHOLOGY	LOND	E	4	616	17
BRITISH JOURNAL OF PSYCHOLOGY	LOND	E	5	159	18
BRITISH MEDICAL JOURNAL	LOND	E		610	19
BULLETIN DE STATISTIQUE	BRUSS	F	3	311	20
CALCUTTA MATHEMATICAL SOCIETY JOURNAL	CAL	E	5	510	21
CALCUTTA STATISTICAL ASSOCIATION BULLETI	CAL	E	5	311	22
CANADIAN JOURNAL OF TECHNOLOGY	OTT	E	4	620	23
CONTRIBUTIONS TO INDIAN SOCIOLOGY	HAGUE	E	8	301	24
CURRENT SCIENCE	BANG	E	3	500	25

Appendix VII

Short Description of Punch-card machines

1. Key punch & Verifier: The key punch machine is the basic means of transcribing data from documents to cards. The verifier machine is auxiliary machine designed to permit complete column-by-column verification of transcription of data into cards.
2. Sorter: Sorter or sorting machine is used for arranging cards in numerical or alphabetical sequence. Sorters are also used for selecting certain items from batch of cards.
3. Reproducer: The reproducers are used for copying punch from one set of cards into another with some variation in card column. Reproducer can also transfer punches from a master card into any number of following cards.
4. Collator: The collator can take some logical decision after making comparison between two sets of data. The collator has four major functions:
   i) File card
   ii) Check sequence of cards
   iii) Compare sets of cards
   iv) Merge sets of cards with selection.
5. Tabulator: The tabulator is a combination of adding, subtracting and printing machine. This machine fulfils basic accounting and statistical needs.

REPORTING OF INDIAN PHYSICS LITERATURE IN THE PHYSICS ABSTRACTS

T S RAJAGOPALAN

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Presents a review of the AIP Report. Shows the output of Indian physics literature according to the AIP Report and the Bibliography. Studies the extent of reporting of Indian literature in the Physics abstracts by number of journals and number of papers. Examines the time-lag from the Bibliography in reporting Indian literature in the Physics abstracts.

1 INTRODUCTION

The Documentation Research Project of the American Institute of Physics has been engaging itself for some years now, in important studies connected with the publication and dissemination of world's physics literature. Since 1962, at least twenty projects are known to have been completed by it and published project reports are available. The information contained in these reports provides a basis for carrying out improvements in the publication and dissemination of physics literature. As bulk of the world's scientific literature appears in serial publications, the Documentation Research Project has done well in taking up recently the study of journal literature of physics by analysing the 1961 volume of the Physics abstracts. The information collected in this study forms part of the Report AIP/DIP PAI(1964) entitled the Journal literature of Physics by Stella Keenan and Pauline Atherton(1) (hereafter referred as the AIP Report).

The unique feature of the report is the comprehensive manner with which the data have been analysed for the various characteristics of the journal literature reported in the 1961 volume of the Physics abstracts. Perhaps this may be first such study wherein the journal literature reported in an abstracting periodical devoted to a particular subject field has been so thoroughly examined. The excellent display of the data in 73 tables accompanied with elegantly designed graphical presentations should serve as a model for those engaged in similar studies. Appendices, eight in number, give several items of related interest including a reprint of a paper by Pauline Atherton and Jean C Yovich on the Study of Physics abstracts - Abstracting three types of Journals.

The report has collected and assembled data on 20,287 papers from 405 periodicals published from 39 countries in 16 languages. The method of coding the information collected during the study has been described with the help of two figures. The information contained in this report is mainly in relation to four major aspects-journal, language, country and subject field. It has been stated that the data will provide answers to questions such as "(a) which journals form the world's physics literature (b) in which countries are these journals published? (c) in what languages is the physics literature written? and (d) how much is written in each subject field of physics, where is it published and in what language"?

The matter has been presented under four heads-General data, Subject data, Country of publication data and Journal data. The General data include information on the number of authors per article, types of abstracts used, language and year of publication of the articles reported in the 1961 volume of the Physics abstracts. Under each of the subsequent studies by subject, country and journal the distribution of abstracts by the above four characteristics has also been furnished. The number of authors per article is in the following proportion: No author-0.33%; one- 49.68%; Two- 31.80%; Three- 12.42%; Four- 3.63%; Five- 1.12%; and Six or more 1.02%. It has been shown from a study of the contri-

butions of the United States that throughout the Physics abstracts, the number of authors per article is more or less in the same proportion as above. As regards the types of abstracts used, 60.26 percent are author abstracts, 36.48 percent are signed (by staff and panel abstractors) and the remaining 3.26 percent are title listing only. The language data give the rankings of 16 languages according to the number of articles accounted by them. English language comes first with 68.39 percent followed by Russian with 15.22 percent. The next in order are French and German with 7.25 percent and 6.42 percent respectively. The data on the year of publication show the distribution of papers reported in the Physics abstracts from pre-1958 to 1961. The 1960 and 1961 literature covered in the 1961 volume of the Physics abstracts amounts to 36.57 percent and 55.40 percent respectively.

The Subject data bring out the distribution and concentration of physics literature in 22 subject fields. The two major subjects are Solid states physics and Nuclear physics represented by 31.1 percent and 21.6 percent respectively of the total physics literature.

The Country data furnish information on the number of contributions of 39 countries by year of publication, number of authors per article, types of abstracts used and language. In addition, data about the contributions of these countries by subject field and by journals with the number of abstracts reported from them are also given. The countries are ranked by number of journals and number of abstracts. The first ten countries by number of abstracts are the United States (31.14%), Russia (16.37%), Great Britain (13.45%), Japan (7.69%), France (6.32%), Germany (6.11%), Netherlands (5.23%), Italy (3.25%), India (1.72%) and Poland (1.50%). The remaining countries account for 7.22 percent.

The Journal data begin with an analysis of the journals of the American Institute of Physics contributing towards the literature reported in the Physics abstracts. The 405 journals covered in the 1961 volume of the Physics abstracts have been ranked into 108 positions by number of abstracts yielded by them. The main journal data provide the breakdown of the abstracts by journals in correlation with characteristics such as year of publication, author per article, type of abstracts, language and subject.

The statement in the introduction to the AIP Report that "it is planned to have a review of the data from each country" prompted us to undertake a study to find the extent and the quickness of reporting of Indian literature in the Physics abstracts. The information collected during the study is presented in the succeeding sections of this paper.

Coverage of Indian Physics Literature

According to the AIP Report India ranks sixth by number of journals and ninth by number of abstracts in the journal literature reported in the 1961 volume of the Physics abstracts. The figures on the number of journals and abstracts of the first ten countries are taken from the AIP Report and given in Table 1 for purpose of comparison.

TABLE 1

Ranking of country by number of journals and abstracts

Country	Rank by Journals	Number of Journals	Rank by Abstracts	Number of Abstracts	Percentage on the total abstracts of PA 1961
France	VIII	14	V	1,268	6.3%
Germany	III	47	VI	1,240	6.1%
Great Britain	II	62	III	2,729	13.5%
India	VI	18	IX	352	1.7%
Italy	VII	17	VIII	675	3.3%
Japan	IV	37	IV	1,560	7.7%
Netherlands	VIII	14	VII	1,043	5.2%
Poland	X	7	X	309	1.5%
U.S.A.	I	71	I	6,316	31.1%
U.S.S.R.	V	24	II	3,317	16.4%

Among the 39 countries found mention in the AIP Report the rankings obtained by India make a creditable account as regards the output of Indian physics literature. Eighteen periodicals are covered in the 1961 volume of the Physics abstracts yielding 352 abstracts. The lower percentage of abstracts as compared to the journals covered indicates that not all the eighteen periodicals are exclusively devoted to physics. The titles of the periodicals and the number of papers abstracted from them in the twelve issues of the 1961 volume of the Physics abstracts are given in Table 2.

TABLE 2

Periodical-wise distribution of abstracts of Indian physics literature

Sr. No.	Title of the Periodicals	Number of Abstracts in 1961 Volume of the Physics abstracts												
		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1	Indian J Phys	-	-	-	-	-	-	18	-	-	1	60	18	97
2	Proc nat Inst Sci Sec A	15	-	-	-	-	-	-	-	-	-	18	45	78
3	J sci industr Res	2	8	5	3	10	5	5	1	1	-	4	12	56
4	Proc Indian Acad Sci Sec A	20	-	2	1	-	-	-	-	-	-	9	23	55
5	Curr Sci	2	-	-	-	-	2	1	3	3	-	2	3	16
6	Indian J theor Phys	6	-	-	-	-	5	-	-	-	-	3	-	14
7	J Indian Inst Sci	-	1	3	-	-	-	-	-	-	-	1	4	9
8	Bull Calcutta math Soc	-	-	-	-	-	2	1	-	-	-	-	2	5
9	Kodaikanal Obs Bull	-	-	-	-	-	-	-	-	-	-	1	4	5
10	Proc nat Acad Sci Sec A	-	1	-	1	-	-	-	2	-	-	-	1	5
11	Defence Sci J	-	-	-	-	-	-	-	-	-	-	-	3	3
12	J Sci Res Banaras Hindu Univ	-	-	-	-	-	-	-	-	-	-	-	3	3
13	Appl Phys Quart	-	-	-	-	-	-	-	-	-	-	-	1	1
14	Indian J Met Geophys	-	-	-	-	-	-	-	-	-	-	1	-	1
15	J Instn Telecomm Engrs	1	-	-	-	-	-	-	-	-	-	-	-	1
16	J Sci Engng Res	-	-	-	-	-	-	-	-	-	-	1	-	1
17	Sci & Cult	1	-	-	-	-	-	-	-	-	-	-	-	1
18	Trans Bose Res Inst	-	-	-	-	-	-	-	-	-	-	1	-	1
	Total	47	10	10	5	10	14	25	6	4	1	101	119	352

A major portion of the Indian literature has been covered in November and December issues of the Physics abstracts. Among the 364 Indian documents abstracted in the 1961 volume of the Physics abstracts, 352 documents are from regular journal literature. The others are from the two Jubilee commemoration volumes of the Indian Institute of Science (Bangalore) and the Calcutta Mathematical Society.

Output of Indian Physics Literature

From the periodicals included in the Directory of the Indian scientific periodicals (2) those publishing papers coming under the subject purview of the Physics abstracts are examined and the data are given in Table 3.

TABLE 3

Indian periodicals publishing papers in subjects covered in the Physics abstracts

Subject	Number of Periodicals listed in the Directory under the class (By UDC Numbers)											
	389	5/6	5	51/56	51	53	54	55	62	66	681.2	Total
Physics	1	17	20	5	1	6	1	-	11	3	1	66
Mechanics	-	17	20	5	7	6	-	1	5	-	-	61
Astrophysics	-	17	20	5	1	-	-	1	-	-	-	44
Physical Chemistry	1	17	20	5	-	3	3	-	3	4	-	56
Geophysics	-	17	20	5	1	-	-	13	-	-	-	56
Ionosphere	-	17	20	5	-	2	-	13	1	-	-	58

The data presented in the above table include periodicals carrying either wholly or partially or even sparingly papers on subjects coming under the purview of the Physics abstracts. The Indian physics literature of the year 1964 has been examined to provide the basis for the data given. Other than the 18 periodicals mentioned in the AIP Report and the periodicals listed in Table 7, the titles of periodicals which also carried papers of physics interest in the year 1964 are given in Table 4.

TABLE 4

Periodicals not covered in the Physics abstracts but covered in the Bibliography of 1964.

U.D.C. No.	Title of the Periodicals	Number of articles appeared in the Bibliography
51	Bull Calcutta math Soc	1
	Matscience Report	2
539.1	Atomic Energy Establishment AEET	2
550.3	Bull nat geophys Res Inst	1
62	Annu Bull int Comm Irrig Drain	1
	Bull India Sec electrochem Soc	2
	Chart Engr	3
	Electrical India	2
	Electro-technics	1
	Engng News	1
	J aero Soc India	4
62	J electrochem Soc India	2
	J Instn Armament Stud	7
	J Instn Telecomm Engrs	12
	Nat aero Lab tech note	5
	Radio Services	2
	Univ Roorkee Res J	5
	Viswakarma	3
66	Cent Glass Ceram Res Inst Bull	1
	Indian J appl Chem	6
	India & Technol	1
	J Instn Chem India	3
681.2	IMDA J	2

In order to show the total output of Indian physics literature independent of the data presented in the AIP Report, the Bibliography of scientific publications of South and South East Asia (referred hereafter as the Bibliography) for the years 1959 to 1964 has been scanned and the number of papers appearing under the subject heads Physics (C), Mechanics (B7), Astrophysics (B9), Physical Chemistry (E:2), Geophysics (H4,H:(C)) and Ionosphere (U296) has been counted and given in Table 5. The above subjects are known to come under the subject purview of the Physics abstracts.

TABLE 5

Papers reported in the Bibliography coming under the subject purview of the Physics abstracts

Years of the Bibliography	Number of papers in						Total number of Papers
	B7 Mechanics	B9:6 Astrophysics	C Physics	E:2 Physical Chemistry	H4;H:(C) Geophysics	U296 Ionosphere	
1959	42	17	201	189	15	19	483
1960	61	16	214	157	18	7	473
1961	84	12	195	189	13	8	501
1962	89	13	245	171	-	8	526
1963	88	9	328	228	2	5	660
1964	99	4	351	162	13	19	648

Scope of the Study

In this paper an attempt has been made to analyse the extent and the quickness with which Indian physics literature gets disseminated to the outside world through reporting in the Physics abstracts. The data presented in the AIP Report do show in some measure the extent and the quickness of reporting of Indian literature but they are mostly in the context of overall coverage of world literature and lack comparison with actual output as measured by our local documentation periodical reporting Indian scientific literature. Studies have therefore been undertaken to find as to what extent and with what speed, Indian physics literature reported in the 1960 and 1961 volumes of the Bibliography has been covered in the Physics abstracts.

While 352 and 263 Indian documents have been abstracted in the 1961 and 1962 volumes of the Physics abstracts respectively, it may be seen from the above table that the output of Indian physics literature is generally much higher. In the years 1961 and 1962, 501 and 526 Indian documents are known to have been published in subjects covered by the Physics abstracts.

Source for the Study

The Bibliography, a monthly documentation periodical brought out by the Insdoc till 1964 (now replaced by the Indian science abstracts) has been our principal service for bibliographical control of Indian periodical literature in science and technology subjects. The papers reported in the Bibliography are selective in that they are original research contributions, or papers presenting new information or techniques or papers giving new presentation of known facts. It may be reasonably expected that the papers reported in the Bibliography are worth reporting by international abstracting services for wider dissemination. As the Bibliography is our local service, its coverage of Indian literature may be regarded as exhaustive. It may be further expected that Indian papers may be reported in the Bibliography within a time lag of one to two months from the release of the periodicals carrying the papers.

2 EXTENT OF REPORTING

To study how exhaustively the Indian literature gets reported in the Physics abstracts, the entries under class Physics (C) in the 1960 and 1961 volumes of the Bibliography have been checked up with the Physics abstracts for their coverage. The search was done in the Physics abstracts upto the years 1963 and 1964 respectively for the 1960 and 1961 volumes of the Bibliography. The search was limited to the class Physics (C) only as it is the umbral subject to the scope of the Physics abstracts. The entries under the class Physics (C) in the Bibliography are expected to be covered fully in the Physics abstracts. The data are given in Table 6.

TABLE 6

Extent of reporting in the Physics abstracts of papers reported in the Bibliography

1	2	3	4	5	6	7
Year of the Bibliography	Entries under Physics (C)	Abstracts reported in PA 59	Percentage	Abstracts reported in PA 60	Percentage	Abstracts reported in PA 61
1960	214	1	0.5%	43	20.1%	96
1961	195	-	-	-	-	86

1	8	9	10	11	12
Year of the Bibliography	Percentage	Abstracts reported in PA 62	Percentage	Abstracts reported in all the years of PA	Abstracts reported in PA 61
1960	44.9%	-	-	140	65.5%
1961	44.1%	26	13.3%	112	57.4%

It is seen from the data presented in Table 6 that the extent of reporting in the Physics abstracts of Indian literature noticed under class Physics (C) in the 1960 and 1961 volumes of the Bibliography comes to 65.5 percent and 57.4 percent respectively. Out of the 214 entries of the year 1960, 24 entries are from periodicals which are totally not covered by the Physics abstracts. Similarly out of the 195 entries of the year 1961, 27 entries are from periodicals which are totally not covered by the Physics abstracts.

While the scanning of the Physics abstracts was done upto the year 1963 and 1964 respectively for checking the entries of the 1960 and 1961 volumes of the Bibliography, most of the entries could be located in the 1961 and 1962 volumes of the Physics abstracts. From the data analysed for recent volumes of the Physics abstracts a trend is seen that it leaves out literature which is received late even at the expense of comprehensiveness.

While most of the Indian physics literature gets published in the eighteen periodicals (See Table 2) mentioned in the AIP Report, there are quite a few others which also carry papers of physics interest (See Table 4). The periodicals covered in the Bibliography of the year 1960 and 1961 but left out of coverage by the Physics abstracts and the number of articles of physics interest appearing in them are given in Table 7.

TABLE 7

Periodicals not covered by the Physics abstracts but covered in the Bibliography of 1960 and 1961.

	No	Name of the periodicals	Number of articles of Physics interest
1960	1	Curr Engng Practice	1
	2	Engineer	1
	3	J Instn Engrs	1
	4	J Karnatak Univ	4
	5	J Univ Poona	2
	6	N M L Bull	3
	7	Trans Indian Inst Metals	9
	8	Vijn Parishad Anusand Patr	2
	9	Vikram Sci	1
		Total	24
1961	1	Agra Univ J Res	1
	2	Altech	1
	3	Chem Age India	1
	4	Electrotechnology	2
	5	Engineer	1
	6	I S I Bull	1
	7	J Maharaja Sayaji Rao Univ Baroda	3
	8	J Mines Met Fuels	1
	9	J Univ Saugar	3
	10	Madhya Bharati	4
	11	Telecomm	1
	12	Trans Indian Inst Metals	5
	13	Vijn Parishad Anusand Patr	1
	14	Vikram Sci	2
		Total	27

The Physics abstracts may do well to cover the above periodicals also to provide exhaustive coverage of Indian physics literature. Apart from the non-coverage of the above periodicals it is observed that not all the papers of physics interest appearing in our periodicals are covered in the Physics abstracts. This may perhaps be due to selective coverage of literature in the Physics abstracts and omission of literature received late.

3 QUICKNESS IN REPORTING

The data in the AIP Report on the number of papers by year of their publication are given in Table 8 for the first ten countries.

TABLE 8

Papers reported in the Physics abstracts by year of their publication

Country	Number of Abstracts in PA 1961	Number of Abstracts by year of Publication					Percentage of abstracts by year of publication on the total abstracts				
		Pre-'58	1958	1959	1960	1961	Pre-'58	1958	1959	1960	1961
France	1,268	2	7	39	570	650	0.2	0.6	3.1	45.0	51.3
Germany	1,240	-	3	110	530	597	-	0.2	8.9	42.7	48.2
Great Britain	2,729	1	11	186	932	1599	0.1	0.4	6.8	34.2	58.6
India	352	-	1	56	200	95	-	0.3	15.9	56.8	27.0
Italy	675	12	-	18	220	425	1.8	-	2.7	32.6	62.9
Japan	1,560	2	11	205	849	493	0.1	0.7	13.1	54.4	31.6
Netherlands	1,043	2	1	32	521	487	0.2	0.1	3.1	50.0	46.7
Poland	309	-	-	50	136	123	-	-	16.2	44.0	39.8
U.S.A.	6,316	3	4	35	1215	5059	0.1	0.1	0.5	19.2	80.2
U.S.S.R.	3,317	12	325	326	1509	1145	0.4	9.8	9.8	45.5	34.5

India ranks tenth in the number of papers of the year 1961 abstracted in the 1961 volume of the Physics abstracts. Only 95 of the 352 abstracts representing 27 percent are from the year 1961. On the other hand about 80.2 percent of the abstracts of the United States are from the papers of the year 1961 itself. This is followed by Italy, the United Kingdom and France with the percentage of 1961 literature reported being 62.9, 58.6 and 51.3 respectively. Correspondingly less number of papers of the year 1960 of these countries are noticed in the 1961 volume of the Physics abstracts. Japan, the only other Asian country among the first ten countries, is also more or less like India in the coverage of literature by year of publication.

However from a further study made on the journal literature covered in the 1962 volume of the Physics abstracts it is observed that more of current year literature than of older literature is being reported. As stated earlier, it may perhaps be due to deliberate omission of literature received late and to restrict the coverage more to the current year literature. The breakdown of Indian papers by year of publication, covered in the 1962 volume of the Physics abstracts is given in Table 9.

TABLE 9

Indian papers in 1962 volume of Physics abstracts by year of their publication

	Pre-1961	1961	1962	Total
Number of Abstracts	12	107	144	263
Percentage	4.5%	40.7%	54.8%	100%

Quickness Compared to the Bibliography

The Indian papers abstracted in the 1961 volume of the Physics abstracts have been checked up with the Bibliography to find when they have been covered in this service. The difference in time-lag in reporting of literature in the Physics abstracts from the Bibliography has been worked out and given in Table 10.

TABLE 10

Difference in time-lag in the Physics abstracts from the Bibliography

Difference in time-lag (in months from the Bibliography	Total number of abstracts	Abstracts from Indian J Phys	Abstracts from Proc nat Inst Sci, Sec A	Abstracts from J sci industr Res	Abstracts from Proc Indian Acad Sci, Sec A
Earlier reporting than the Bibliography)	5	-	4	1	-
Simultaneous reporting with the Bibliography	4	-	1	-	-
1	7	2	-	4	-
2	27	11	7	6	-
3	15	3	3	3	2
4	25	8	-	1	-
5	11	2	-	2	-
6	10	3	-	3	-
7	11	4	-	2	-
8	9	3	-	1	2
9	31	12	14	2	1
10	20	6	4	2	7
11	19	-	10	5	3
12	18	12	1	1	4
13	29	8	12	2	6
14	26	9	11	2	3
15	11	8	-	-	3
16	10	3	4	-	3
17	8	-	3	-	5
18	7	1	1	-	5
19	5	-	-	-	5
20	3	1	-	-	2
21	1	-	-	-	1
22	1	-	-	-	1
Total	313	96	75	37	53

The time-lag in reporting of papers of four important periodicals is also given in addition to the time-lag on the total coverage. The Bibliography has reported 313 papers only out of the 352 papers reported in the 1961 volume of the Physics abstracts. Further at least 9 papers appear to have been covered earlier or simultaneously with the Physics abstracts. In less than a time-lag of six months from the Bibliography 104 papers representing 33 percent have been covered in the Physics abstracts. This may be considered as a quick coverage. About 108 papers representing 35 percent have been covered in a time-lag ranging from six months to one year. This is the average speed of reporting in international abstracting services today. Beyond a time-lag of one year, 101 papers representing 32 percent have been covered. This may be regarded as delayed reporting.

4 CONCLUSION

From the data given in this paper it may be seen that while the extent and the quickness of reporting of Indian literature in the Physics abstracts may be considered satisfactory, there is still scope for improvement. If it is the present practice of the Physics abstracts to leave out literature which is received late, as it appeared to us

in this study, it is likely that the Indian physics literature may not get reported in the Physics abstracts comprehensively. The Indian science abstracts (monthly) being published by the Insdoc since January 1965 may help considerably the international abstracting services like the Physics abstracts in noticing the Indian literature exhaustively and disseminating them expeditiously.

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SOME IMPRESSIONS ON SOVIET SCIENTIFIC INFORMATION SERVICES

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Describes the work of acquisition of publications in the Soviet Information Centres and Libraries in respect of centralised organisation, Statutory obligations and exchanges. Explains the various Abstracting and Indexing services. Gives an account of the Current Awareness Services. Mentions the present approach towards classification. Describes the translation services and traces the development of automation in Information services.

INTRODUCTION

Under the Indo-Soviet Cultural Exchange Programme, I was provided with an opportunity to visit the USSR during the months May - August 1964 to study the Soviet information and library practices. My programme of study was organised by the VINITI (= Vsesoyuznii Institut Nauchnoi i Tekhnicheskoi Informatsii. All Union Institute for Scientific and Technical Information). While several valuable surveys have been made and have been published already, an attempt is made in this paper to record my own observations by way of addition to our existing knowledge on the Soviet Information practices. It is also hoped that the account given in this paper may be of some use to those engaged in similar work in our country.

ACQUISITION

Centralised organisation of acquisition work, extensive exchange relations and statutory obligations for several libraries to get Soviet publications are some of the salient features in the acquisition of materials by the Soviet libraries.

Centralised Acquisition

The Soviet Union follows a system of centralised acquisition for obtaining reading materials. This system is found helpful and has now reached a high degree of perfection yielding good results. All big libraries and the Central Information Services are in a position to get every Soviet publication and all worthwhile foreign publications. The scientists are thereby assured of access to world literature. Every possible effort is being made to obtain publications from almost all countries and published in several languages. Three organisations are presently engaged in the work of centralised acquisition. They are:

1. Vsesoyuznaya Knizhnaya Palata, Kremlevskaya Naberezhnaya 1/9, Moscow G-19 (All Union Book Chamber)
2. Tsentralnii Kollektor Nauchnikh Bibliotek, ul. Neglinnaya 9, Moscow (Central Collector for Scientific Libraries)
3. Mezdunarodnaya Kniga, Moscow G-200

The first two are concerned with the supply of Soviet publications while the Mezdunarodnaya Kniga, which is one of the Departments for Book Trade under the Ministry of Trade, deals with foreign publications. The Mezdunarodnaya Kniga also supplies Soviet publications to foreign buyers.

Soviet Publications

The publishing trade is expected to deposit by law free of cost fifteen copies of every publication with Vsesoyuznaya Knizhnaya Palata. In addition, 150 copies are supplied on payment to the Tsentralnii Kollektor Nauchnikh Bibliotek. These two organisations in turn distribute the copies to the interested libraries and institutions.

Foreign Publications

As stated earlier, the Mezdunarodnaya Kniga is the sole organisation which undertakes supply of foreign books to Soviet libraries. However greater emphasis is placed on exchange for obtaining foreign publications. It is said that more than sixty percent of the requirements of foreign publications is met by exchange relations. Many big libraries like Gosudarstvennaya Biblioteka SSSR imeni V.I. Lenina (Lenin State Library of the USSR), Publichnoi Biblioteki imeni M.E. Saltykova-Shchedrina (Saltykova-Shchedrina State Public Library), Biblioteka Akademii Nauk SSSR (Library of the Academy of Sciences of the USSR), have departments exclusively for exchange work. They entertain exchange relations directly with foreign institutions. For this purpose the exchange departments stock Soviet publications. The following table shows the extent of exchange programmes of a few important Soviet libraries.

TABLE

Name of the Library	Exchanges with	
	No. of institutions	No. of countries
1. Vsesoyuznaya Patentno-tekhnicheskaya Biblioteka, Berezhkovskaya Naberezhnaya 24, Moscow (All Union Patent & Technical Library)	36	36
2. Tsentralnaya Nauchnaya Selskokhozyaistvennaya Biblioteka, Orlikov per 1/11, Moscow K-12 (Central Scientific Agricultural Library)	650	59
3. Gosudarstvennaya Biblioteka SSSR imeni V.I. Lenina, ul. Kalinina 3, Moscow G-19	3000	85
4. Gosudarstvenii Universitet imeni M.V. Lomonosova, Lenin Hills, Moscow (Library of the Lomonosov State Univ)	800	85
5. Gosudarstvennaya Tsentralnaya Nauchnaya Meditsinskaya Biblioteka, Sadovo-Kudrinskaya 1, Moscow (State Central Scientific Medical Library)	1074	69
6. Gosudarstvennaya Publichnaya Nauchno-Tekhnicheskaya Biblioteka SSSR, Kuznetskii Most 12, Moscow-31 (State Public Scientific and Technical Library of the USSR)	1023	43
7. Biblioteka Akademii Nauk SSSR, Birgevanya Liniya 1, Leningrad V-164	2433	91
8. Publichnoi Biblioteki imeni M.E. Saltykova-Shchedrina, Sadovaya ul. 18, Leningrad-69	2000	73

Exchange arrangements are mostly entered into on the basis of title to title while a few others take also into consideration cost of publications. However they are very liberal in dealing with Socialistic countries and the newly developing countries, and cost considerations do not always matter much in these cases. The criterion for exchange of patent specifications is on yearly fund basis.

BIBLIOGRAPHICAL SERVICES

Centralisation is the keynote in the organisational pattern of the Soviet information services. The bibliographical services may be broadly classed as abstracting services and indexing services. While the abstracting services are carried on by the Information Institutions, the indexing services are taken care of by the Libraries.

The services are undertaken for all levels of users, namely scientists, engineers, workers, students, and so on. The services are provided by a few Institutions and Libraries functioning at national level and having adequate resources. There is perfect coordination among them in undertaking the services. Duplication is avoided as far as possible. If at all there is any duplication like the one between the Patent Information Service and the Abstracting services of the VINITI, it is intentional. There are yet no abstracting services for agricultural subjects. However plans are underway by the Tsentralnaya Nauchnaya Selskokhozyaistvennaya Biblioteka (Central Scientific Agricultural Library) to start a service.

USSR Academy of Sciences

Akademii Nauk SSSR is the supreme body for sciences in the USSR. "The USSR Academy of Sciences is a complexly-organised and widely-ramified institution directly subordinate to the USSR Council of Ministers and responsible for the conduct of basic and applied research in the major branches of knowledge. The academy is governed by a board (Presidium) and consists of seven major departments. Each department consists of specialised institutes, laboratories, museums, experimental stations, and the like. Directly under the Presidium are various concils and commissions with specific research, publishing, administrative functions and the principle libraries of the Academy" (1).

VINITI, the largest information centre in the Soviet Union functions under the control of the Presidium of the USSR Academy of Sciences. The centre started functioning in the year 1952 for providing centralised services to scientists and engineers. The Central Library of the USSR Academy of Sciences in Leningrad is one of the oldest (founded in 1714) and biggest (collection of 14 millions) libraries in the Soviet Union. The Library is connected to a chain of 180 libraries of the Academy situated in various parts of the country.

Abstracting Services

The abstracting services are organised at the National level only. The VINITI publishes the well known abstracting periodical, Referativnii zhurnal (RZ) which is now appearing in twenty five series on various branches of knowledge. It is considered to be a mighty attempt in the world today for a single agency to undertake such a comprehensive abstracting service covering all branches of science. The main series are broken down further into 127 sub-series. The number of series is being increased from time to time. It facilitates a subscriber to obtain either the combined volume of the main series or the sub-series in the narrower subjects according to his requirements. In addition to above, thirty two separate parts on subjects not covered by the main series are also published. The series excepting those mentioned below are published monthly.

1. Biologiya (Biology)	24 nos/year
2. Khimiya (Chemistry)	-do-
3. Biologicheskaya khimiya (Biological chemistry)	-do-
4. Zhivotnovodstvo. Veterinariya (Animal husbandary. Veterinary Sc)	-do-
5. Obshchiye voprosy patologi (General problems of pathology)	-do-
6. Pochvovedeniye (Soil science)	-do-
7. Rastenievodstvo (Crop husbandry)	-do-
8. Farmakologiya. Toksikologiya (Pharmacology. Toxicology)	-do-
9. Nauchnaya i tekhnicheskaya informatsiya (scientific & technical information	6 nos/year

Out of the twenty five main series as many as six series are devoted to Engineering subjects alone and they are published monthly. They are:

1. Avtomatika, telemekhanika i vychislitelnaya tekhnika (Automation, computation & telemechanics)
2. Radiotekhnika i electrosvyaz (Radio engineering and electrical communication)
3. Teploenergetika (Thermal power engineering)
4. Tekhnologiya mashinostroeniya (Mechanical engineering)
5. Elektronika i yeyo primenenie (Electronics and its applications)
6. Elektrotekhnika i energetika (Electrical and power engineering)

The RZ attempts to cover fully the world scientific literature in as short time as possible. It takes approximately six months to one year to notify the literature in the RZ. About 18,000 periodical publications and other publications in 61 languages are obtained from 98 countries for inclusion in the RZ. Out of this about 3,000 publications alone are from the Soviet Union. In addition, patent specifications numbering about 220,000 are obtained every year through the Vsesoyuznaya Patentno tekhnicheskaya Biblioteka (All Union Patent and Technical Library). During the year 1962, RZ published 7,04,000 abstracts as compared to 1953, in which year the number of abstracts published was only 14,500 (2). The RZ covers all scientific and technical subjects excepting Agriculture, Building and Architecture and Medicine which are taken care of by the other Information Institutions specialising in these subjects.

Organisation of RZ

The VINITI has at present a staff of about 3500 persons. About 1500 persons are engaged in printing and publishing work. The others are distributed among the Preliminary Processing Departments, various Editorial and Abstracting Departments, Translation Department, Automation Department and Methodology Department. The work in the editorial departments is distributed according to language and subject specialities. The work in the acquisition department which is responsible for procuring the literature is distributed according to countries. On receipt, the documents are distributed according to language speciality to respective departments. Hence the work relates mainly to classification. The classification is very broad and does not therefore involve assignment of any class number. In the editorial department there are as many groups as the number of series brought out. Each editorial group is headed by a highly qualified scientist. He is assisted by subject specialists. It is in this department that the actual work of abstracting, distribution of the documents to the panel abstractors, etc. are carried out. There is a large number of subject specialists on the panel of abstractors for all the series taken together. About eighty to ninety percent of the documents are abstracted by the panel abstractors. Payment to the panel abstractors is stated to be decided on the basis of the quality of the abstracts. Documents are usually obtained in more than one copy. The additional copies are utilised for panel abstractors. If one copy only is received, photocopies are made and sent to the panel abstractors. Printed guides for abstracting work are also available for the benefit of fresh entrants to the panel. The editors are expected to ensure that the abstracts prepared by the panel abstractors conform to the standards prescribed. There is no fixed limit to the length of an abstract. It largely depends on the originality and value of the publication and the space available finally for printing. The editors however modify occasionally the length of the abstracts to suit space requirements. In case of documents in Japanese, Chinese, and Scandinavian languages, author abstracts are translated and are made use of. It may perhaps be due to some temporary deficiency in translation facilities in these languages. The work involved at the various stages in the production of the RZ is as follows:

Preliminary Processing

1. Acquisition of Soviet and Foreign publications
2. Classification: Classing and marking documents for various editorial departments
3. Bibliography: (i) standardising and typing of entries on cards
   (ii) checking the typed entries
4. Photocopying of the documents for sending to the panel abstractors.
5. Sorting: (i) Clipping the cards to the corresponding photocopies of the documents
   (ii) sorting the sets according to the editorial departments for which the documents are already marked by the classification group
   (iii) passing on the documents to the editorial departments

Editorial Departments

1. Technical group
   (i) receiving the processed documents

(ii) sending the documents to the panel abstractors
(iii) keeping record of flow of documents from this group to panel abstractors and back
(iv) preparing statements for payments to the panel abstractors
(v) laying out the abstracts along with the bibliographical details for printing
(vi) sending the laid out abstracts for printing
(vii) proof reading

2. Editors

(i) selecting the panel abstractor
(ii) editing the abstracts. Sometimes do also the abstracting work
(iii) evaluating and deciding the remuneration to be paid to panel abstractors
(iv) general organisation of the editorial department

3. Printing and publishing department

4. Indexing department

The problem of dealing with overlapping areas is solved conveniently at the VINITI. At the classification stage, the subject fields of the document having a bearing on more than one subject are marked out according to the degree of relevence and usefulness. The document is first sent to that editorial department of the subject in which it has primary importance. The abstract prepared in the first editorial department is sent to the other editorial departments in the same order as marked out earlier and if it is desired to cover the document in their series also, suitable changes are made in the abstract to provide slant. The abstract is thus prepared only once by the panel abstractors and the same abstract is made use of by the different series. Apart from saving in the abstracting work, there is also economy in the work of acquisition, standardising the bibliographical entries, translation, etc.

The indexes are compiled by conventional methods. Very recently the VINITI has started preparing the author index by machine. The subject index for one of the series of the RZ namely Avtomatika i Radioelektronika is now prepared by machine. Possibility of preparing the subject index by machine for other series of the RZ is also being considered.

Other Abstracting Services

There are two other abstracting services in addition to RZ. They are Meditsinskii Referativnii zhurnal (Medical abstracting journal) and the abstracting journal for Building and Architecture.

Meditsinskii Referativnii zhurnal is published by the Vsesoyuznii Nauchno-Issledovatselskii Institut Meditsinskoi i Mediko-Tekhnicheskoi Informatsii (All Union Institute for Medical and Medico-Technical Information), Moscow. It is published in thirteen series covering about thirty five areas in medicine. Every month about 4,000 to 5,000 entries either with abstracts or with annotations or with bare bibliographical details are given. The organisation of work in this case differs from that of the RZ in two respects. While the VINITI itself acquires the literature, the Medical Institute depends on the Gosudarstvennaya Tsentralnaya Nauchnaya Meditsinskaya Biblioteka (State Central Scientific Medical Library), Moscow. The bibliographical details for most of the publications are copied on cards from the collection of the Medical Library. In cases where the documents are not procurable by them from the Medical Library, the cards containing the bibliographical data are sent to the panel abstractors, who themselves arrange to obtain the originals from the Medical Library for abstracting purposes. Unlike the VINITI where photocopies of documents are supplied to the abstractors, the procedure followed by the Medical Institute in expecting the abstractors to arrange themselves the originals in most cases brings about economy in respect of staff and material. The publication of the abstracts is also stated to be expedited. The difference in practice in these two organisations is probably for the reason that the VINITI abstractors are scattered far and wide extending even beyond Moscow, whereas the abstractors for the Medical Institute are mainly concentrated in and around Moscow.

The practice followed in abstracting service for Building and Architecture differs also from the earlier two services.

As is the case with the Medical Institute, the Tsentralnii Institut Nauchnoi Informatsii po Stroitelstvy Arkhitekture Gosstroi SSSR (Central Institute for Scientific Information in Building and Architecture), Moscow does not also acquire the publications itself. The publications are borrowed from the State Committee for Building, Department for Foreign Relations. Here the articles are first translated fully by the staff translators before preparing the abstracts. Eighty percent of the abstracts are made by the staff abstractors themselves which is just the reverse in the case of RZ. As the number of documents to be covered is very much less in this service, they are in a position to effect these changes in the routine from that of the VINITI and the Medical Institute with economy and efficiency.

Indexing Services

The indexing services are provided by the libraries only at the local levels. Indexing service is most popular of all the services provided by the libraries and it therefore receives greater attention.

Individual libraries compile occasionally as well as regularly bibliographies on special subjects and lists of recommended reading materials. The work of compiling special bibliographies is coordinated, for example, Gosudarstvennaya Biblioteka SSSR imeni V.I. Lenina (Lenin State Library) takes care of Humanities; Tsentralnaya Nauchnaya Selskokhozyaistvennaya Biblioteka (Central Scientific Agricultural Library) - Agriculture; Gosudarstvenaya Tsentralnaya Nauchnaya Meditsinskaya Biblioteka-Medicine; Biblioteka Akademii Nauk SSSR - Natural sciences; and so on. The Gosudarstvennaya Publichnaya Nauchno-Tekhnicheskaya Biblioteka SSSR (State Public Scientific and Technical Library of the USSR) brings out regularly current lists of books, periodicals, articles, industrial catalogues, etc. For example, Novie knigi po tekhnikie dlya rabochikh is published fortnightly and lists recommended books of interest to the workers. Each issue covers 10-15 current books and the list is published in six series covering different industries. These lists are found to be of great value to engineers and workers in their daily work.

National Bibliography

National bibliographies are compiled by the Vsesoyuznaya Knizhnaya Palata (All Union Book Chamber), Moscow, which is the depository by law for all Soviet publications. The main characteristic of the set up of National Bibliography is that it is organised for complete bibliographical control of every kind of macro as well as micro documents such as books, periodicals, etc. The National Bibliography is therefore a diversified one according to kinds of documents. The entries in the bibliographies are given in classified sequence. Indexes are also provided. The periodicity of the bibliographies is also conveniently determined according to the kinds of documents, covered by them. Few important series in the National Bibliography are given here by way of illustration.

The Knizhnaya Letopis lists Soviet books. It is published weekly with quarterly author and subject indexes. It has annual cumulations also. The bibliography gives about 1,000 entries every week and the entries are classified according to the UDC.

The Letopis periodicheskikh izdanii is an annual National Bibliography listing Soviet newspapers and periodicals. It is published in two parts, the first part being devoted to the Soviet newspapers and periodicals, which are new, renamed or ceased publication, while the second part lists various serials on collections of scientific works, scientific notes, etc. The annual bibliography is cumulated every five years. A cumulated volume for 1917-1949 for the Soviet periodicals (excepting the newspapers) has been published. The work of preparing a separate edition for the newspapers covering the years 1917-1960 is in progress and it is expected to be completed in the year 1967.

The Letopis zhurnalnikh statei lists articles from Soviet periodicals and is published weekly with author index for every issue and geographical index in every quarter.

The Letopis gazetnikh statei is published monthly which covers articles from the central newspapers, the newspapers from Moscow, Leningrad and Republics of

the Soviet Union. Every issue contains author and geographical index.

There are a few more bibliographies compiled at the National level, such as Kartograficheskaya letopis (annual) for maps, Letopis muzikalnoi literaturi (quarterly) for music, Letopis retsenzii (quarterly) covers reviews on Soviet books appeared in different sources, and so on.

The All Union Book Chamber also publishes annually Bibliografiya Sovetskoi bibliografii which is the list of Soviet bibliographies.

PATENTS INFORMATION

Dissemination of patents information is the main activity of the Tsentralnii Nauchno Issledovatelskii Institut Patentnoi Informatskii i Tekhniko-ekonomicheskikh Issledovanii (Central Scientific Research Institute for Patent Information and Techno-economic Research), Moscow. The Institute gets cooperation from the Vsesoyuznaya Patentno-tekhnicheskaya Biblioteka (All Union Patent and Technical Library), Moscow which has the world collection of patents. About 250,000 foreign patents from about thirty six countries are received annually by this Library. A fortnightly bulletin, Bulletin isobretenii i towarnikh znanov (Bulletin for patents and trade marks) covers Soviet patents and trade marks. About ten thousand patents are listed in the bulletin in a year. The Institute provides also card service for patents information.

Patent reviews on specific subjects are also prepared by the Institute. About 100 reviews are published every year. The reviews usually contain some of the major aspects of investigations with illustrations. About 30-40 patents are referred by way of examples and at the end list of patents consulted is given. In addition, statistical figures by year, country, etc. on the patents referred are given. The reviews are prepared by subject specialists on the staff of the Institute.

CURRENT AWARENESS

Considerable importance is given to keep the scientists, the engineers and the workers informed in the quickest possible time of the current literature being published on their subjects. This is achieved by the Express Information Service (EI) in the first instance. There are also other services providing liaison between research and industries.

Express Information

The several information institutions in the Soviet Union in addition to other services provided by them bring out express information services. The express information services are not identical at all these institutions and there are variations.

The VINITI's EI was started in 1955 when sixteen series were published. The number of series increased in 1963 to sixty one and in the year 1964 it was published in sixty seven series. The number of entries in 1955 was about 4,000 and in 1962 the number of entries was about 20,000. (2). Each series of the EI is published forty eight times in a year. The time lag in reporting in the EI is about two months only whereas in the RZ it is between six months to one year. The selection of documents for inclusion in this service is done by specialists in narrow disciplines and it is on the basis of immediate requirements of the research work in progress in the country. The EI covers only foreign documents. Detailed abstracts and sometimes almost complete articles are incorporated into this service. The abstracting work is done by outside specialists in the stipulated time of seven to ten days.

The Information Institute of Medicine issues the EI in the form of cards giving only bare bibliographical details of the documents. On the other hand the EI for Building and Architecture is published in two parts - the first part devoted to the account of local experts on their experience at home and abroad and the second part devoted to selected foreign literature. The Central Scientific Agricultural Library publishes a fortnightly EI in two parts, namely Soviet agriculture and Foreign agriculture.

Liaison Between Research and Industry

The Soviet Union is divided into twenty industrial regions. Each region has a Council of National Economy (Sovnarkhoz) which acts as the coordinating body for looking after industrial progress of the

region. The responsibility for the dissemination of scientific information is shared jointly by the Regional Councils, Dom Nauchno-tekhnicheskoi Propagandii (Centres for Scientific and Technical Dissemination), the State Technical and Scientific Library of the USSR, and various documentation departments and libraries attached to industries. There are about 100 Centres for Scientific and Technical Dissemination in the 20 industrial regions, the oldest being located at Leningrad. The State Technical and Scientific Library takes into consideration the overall national interest in all its bibliographical activities. This Library is connected to a chain of smaller libraries operating at various levels and thereby ensures flow of information to all medium and small industries which do not have information departments of their own. However the Documentation Departments and Libraries attached to big industries could themselves serve their clientele by issuing out bibliographies on subjects of immediate concern to their own work. These big industries share among themselves without reservation the information collected by them.

The Centres for Scientific and Technical Dissemination organise their information services as below:

(i) Seminars through which workers share their experience. The subjects for the discussion are chosen in consultation with the specialists.

(ii) Exhibitions for education and introduction for new products (or new inventions) etc.

(iii) Publicity on new products through placards, leaflets, etc. The inventors are requested to write short account with illustrations on their achievements and it is given wide publicity to other industries of the similar nature.

(iv) Very important details, designs and drawings, concerning a new invention are reproduced and circulated to similar enterprises.

CLASSIFICATION

The Soviet libraries were following till recently the so-called Soviet Dewey classification scheme which is now being abandoned. A new Soviet classification scheme which is on the lines of the Universal Decimal Classification (UDC) is under introduction. In this scheme knowledge is divided according to Marxist-Leninist principles. In the libraries documents are not arranged on the shelves following this scheme and the classified approach is provided only through the catalogue.

For the information services the UDC is being followed. It is said that there are even statutory obligations to follow this scheme. The UDC has been translated into the Russian language. However the information services just give the UDC numbers against each entry without following the sequence.

TRANSLATION SERVICES

The Soviet scientists have also to overcome the language barrier as major part of the scientific literature is being in languages unfamiliar to them. They, however, are very much interested to be kept well informed of the scientific progress being made elsewhere. To a large extent the RZ is expected to meet this need. The translation work in RZ is carried on efficiently by employing scientists cum language specialists for abstracting work. As far as possible detailed abstracts with all important data are given so as to minimise the need for going through the originals. If translations of full articles are needed for detailed study, facilities are available at almost all the Information Institutions.

Translation service is not completely centralised. There is however coordination in translation services among all the Information Institutes for avoiding duplication. Translation services are offered by Information Institutes on the subjects of their speciality only. For example, the Information Institute for Building and Architecture translates cover to cover documents on the subjects of their interest and publishes abstracts. The translations are preserved for future use. Similarly the Medical Institute and the State Central Agricultural Library take up translations in their respective subjects. Only VINITI's translation bureau undertakes translation work on any subject. The bureau consists of 42 staff editors knowing English, French, German, Eastern languages, etc. and over 3000 out-

side translators and editors. Depending upon the length of the document, the translation, including editing and typing work, takes from 10 days to 3 months. The charges for a translation are calculated on the basis of a unit, called 'Printed page', each of which consists of 40,000 printed marks. The rates of the charges are as stated below:

Translation into Russian	60 Rub/printed page
Translation into foreign language	80 Rub/printed page
Copy of the translation (both into Russian and Foreign languages)	7 Rub/printed page

Outside translators are paid at the rate of 60 Rub/printed page depending on the quality of the work. The bureau issues a monthly catalogue of translations done by them. The catalogue lists about 800 translations every month.

It is stipulated by law that copies of all the translations done anywhere in the Soviet Union should be deposited centrally at the State Public Scientific and Technical Library. Thus all the translations done in the USSR are collected together and this helps to eliminate duplication in translation effort. It also facilitates in providing quickly copies of translations already done. The Library brings out a fortnightly list, namely Spisok perevedov which notifies translations deposited during that period.

AUTOMATION

On the use of machines for information work a beginning has been made recently. They are alive to the potentiality of machines in information work and experiments are being carried on in this direction. The VINITI's Department for the Mechanisation of Information Processes and Information Institute for Patents are at present engaged in mechanical translation work.

The VINITI has developed new document copying equipments, namely, thermocopier, electrophotography, electrophot, and electronic copying machine (EKA-II).

Another device developed by the VINITI is on the quick retrieval of information on microfilm. This is known as 'POISK' in which thirty five mm microfilm of 250 meters length containing about 10,000 pages can be fed. By giving signals the device can bring before the reader in a matter of a few seconds any required portion of the document. Special arrangements in the same device are also made for xerographic copying of any desired portion. The department is also engaging itself in machine indexing.

ACKNOWLEDGEMENT

I wish to express my grateful thanks to Padma Shri B.S. Kesavan, Director, Insdoc for giving me this valuable opportunity to visit the USSR. I am also thankful to Prof. A.I. Mikhailov, Director VINITI and his staff; to the Academy of Sciences of the USSR; to the Directors and staff of all the organisations I visited for giving all possible facilities in making my visit very useful.

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CURRENT DOCUMENTATION LITERATURE

CDL is an index to current periodical literature in Library Science, Documentation, Reprography and Translation. This index is mainly intended to serve the professional needs of librarians, documentalists and students. An attempt is made to minutely classify the articles. This experiment, we hope, will throw some light on the many problems of library classification and eventually lead to acceptable solutions.

This issue carries 561 entries of original and informative articles published currently in periodicals in the English, some of the other European, Japanese, and Indian languages totalling 61.. The number of periodicals covered in this issue is about 30% more than in the previous issue. It is the intention of the publisher to give a still wider coverage of periodicals.

The arrangement of entries is according to the Colon Classification ed 6, 1963, supplemented by the tentative depth schedules for classification, cataloguing and bibliography published earlier in the Annals, and for book science published recently in Library Science with a slant to Documentation. Slight changes have been made in the use of these schedules. An attempt has been made to give coextensive class numbers to the extent possible. It is proposed, however, to develop finally, elaborate schedules for this purpose, on the basis of our experience in the compilation of this list.

We earnestly hope this feature in the Annals will be received well by the subscribers. Any suggestions to improve the quality of the index will be very welcome and thankfully acknowledged.

Compiled by:

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GUHA B
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